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RVAN: Research Vessel ANalysis programs

Edited by D. Clay

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August 1989

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Fisheries and Aquatic Sciences
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Fisheries and Oceans   Pêches et Océans

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Canadian Manuscript Report of Fisheries and Aquatic Sciences

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Les rapports manuscrits sont produits à l'échelon régional, mais numérotés à l'échelon national. Les demandes de rapports seront satisfaites par l'établissement auteur dont le nom figure sur la couverture et la page du titre. Les rapports épuisés seront fournis contre rétribution par des agents commerciaux.

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August 1989

```
RRRRRRRRR    VVV             VVV      AAA         NNNNN        NNN
RRR'  'RRR    VVV           VVV      AAAAA        NNN NNN      NNN
RRR     RRR    VVV         VVV      AAA AAA       NNN  NNN     NNN
RRR    RRR      VVV       VVV      AAA   AAA      NNN   NNN    NNN
RRRRRRRR         VVV     VVV      AAA     AAA     NNN    NNN   NNN
RRRRRR            VVV   VVV      AAAAAAAAAAAAA    NNN     NNN  NNN
RRR  RRR           VVV VVV      AAA         AAA   NNN      NNN NNN
RRR   RRR           VVVVV      AAA           AAA  NNN       NNNNNN
RRR    RRR           VVV      AAA             AAA NNN        NNNNN
```

R esearch
V essel
AN alysis programs

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..... blank page ..... the end 443

The original intention was to append the source code listings to this report, however the volume of data has made this impossible. Thus the listings are available as an Annex through the editor.

---

* The source listings are available from the editor. If computer readable listings are required please send five 3 1/2 inch floppy disks formatted to 720 Kb with the request.

ABSTRACT

Clay, D. 1989. RVAN: Research vessel analysis programs. Can. Man. Rep. Fish. Aquat. Sci. 2044: 133p.

This documentation is provided to aid those persons using the Department of Fisheries and Oceans (DFO) database of research vessel groundfish surveys conducted annually in the southern Gulf of St. Lawrence. The programs are written in 'Turbo Pascal' and include a data editor/validation system, a report generator, an analysis system to provide biomass and catch at age estimates, and a plotting package to map the various forms of the data.

The data can be either in the form used by the Gulf Region of the DFO or that used prior to 1984 by the Scotia Fundy Region of the DFO. The data formats are provided and source code listings are available.

RESUME

Clay, D. 1989. RVAN: Research vessel analysis programs. Can. Man. Rep. Fish. Aquat. Sci. 2044: 133p.

Cette documentation a été préparée pour aider les personnes qui utilisent la base de données de l'étude annuelle des poissons de fond conduite dans le sud du Golfe Saint-Laurent par navire de recherche de la Ministère de Pêches et Oceans (MPO). Les logiciels sont écrit en language "TURBO PASCAL" et comprennent un logiciel pour l'édition et la validation des données, un système pour produire divers sommaires, un logiciel d'analyse de la biomasse et des estimés des captures ainsi qu'un système de traçage de cartes pour la représentation des données.

Les données peuvent être soit dans le format utilisé par le MPO, Région du Golfe, soit dans le format utilisé avant 1984 par le MPO, Région de Scotia-Fundy. Les formats des données sont fournis et les programmes sont disponible.

INTRODUCTION AND ACKNOWLEGEMENTS

This collection of programs was written partially under contract to the Department of Fisheries and Oceans, Gulf Fisheries Center by ISMT-Microcybernetics and partially by DFO staff. These programs were designed to replace the STRAT and STRAP systems utilized currently and in the past by the other regions of DFO within the Atlantic zone. (STRAP is a newer re-designed program that has replaced STRAT.)

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ISMT-Microcybernetics Ltd.
P.O. Box 3663
Halifax, N.S. B3J 3K6

PROGRAMS and FILES COVERED

	Contract	Date written	Last version	Last update
Documentation	no	87/02	ver 3.1	89/01/20
AltCol	no	85/04	ver 2.065	88/08/20
CheckIT	yes	85/10	ver 3.12	89/01/19
LoranC2	yes	86/02	ver 1.0	86/02
DataLst	no	88/08	ver 1.1	88/12
BioFreq	yes	85/02	ver 3.0	88/08
BldSet	yes	85/02	ver 2.3	87/04
BldCat	yes	85/02	ver 2.3	87/04
BldLen	yes	85/02	ver 2.31	89/04
BldBio	yes	85/02	ver 2.3	87/04
CatStat	yes	85/03	ver 4.00	89/05
MALKey1	yes	85/04	ver 3.31	89/05
MALKey2	yes	85/04	ver 3.6	89/06
MALKey3	no	88/04	ver 3.01	89/04
SpBld	yes	85/07	(taken out of use)	
PikAMap	no	87/06	ver 2.0	89/01/15
CatMap	no	87/06	ver 2.0	87/05/24
AtlMap	no	87/08	ver 2.1	89/01/20

This document outlines a series of utility and statistical programs used to edit, list, plot, and analyse research vessel survey data on a cruise and species basis. Several utility programs and common data format files are included as a part of this documentation package. Appendices provide the source code listing for each of the programs in this collection.

DOCUMENTATION for Research Vessel ANalysis programs
(version 3.1)

R esearch
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Background to Research Vessel Surveys and Analysis

Along Canada's east coast, fisheries managers formulate the harvest of marine species based on analytical stock assessments. These can take any one of three main forms -

- Catch Per Unit Effort (CPUE) - sometimes referred to as 'status quo' - maintain the effort (fishing mortality) at recently acceptable levels,
- General Production Models - fisheries with a long history of limited catch and effort data, and
- Virtual Population Analysis (VPA or SPA) - age structured models of population estimates.

VPA is based on 'our best estimate' - the best estimate is selected by comparing a range of possible answers (population estimates) with one or more fishery independent indices of abundance. This process is called calibration.

Research vessel surveys are one of the most common independent estimates of abundance. The fall groundfish survey in the southern Gulf of St. Lawrence used a random stratified daylight-only design agreed to in the late 1960's by ICNAF (International Commission of North Atlantic Fisheries). The aim was to establish ICNAF wide standardized coordinated surveys.

Research surveys have the following principal objectives:

- to monitor fluctuations in structure and size of fish populations within the survey area,
- to assess the fish production potential of Atlantic coastal waters, and
- to determine environmental factors controlling fish distribution and abundance.

Stratified random design was selected for the surveys because:

- it produces unbiased estimates of abundance with associated estimates of precision,
- it permits sampling to be spread over the total area of interest,
- it permits sampling rates to be varied between strata to improve precision, and
- it allows post aggregation of strata.

The stratification scheme chosen for Atlantic Canada was based on depth. This was because large scale trends related to hydrographic and bathymetric conditions were evident, it was assummed that some homogeneity of environment would relate to these areas. To exploit these trends the stratified random sampling scheme was implimented over the purely random scheme. The stratification was based on depth ranges 0 to 91 m, 92 to 183 m, and 184 to 366 m.

Problems with the stratified random daylight scheme used in the southern Gulf area are:

- to produce unbiased estimates with acceptable confidence intervals it would be necessary to sample an order of magnitude more intensively than we now do,
- diel variation is highly significant for some species (this variation was accounted for prior to 1985 when only daylight surveys were conducted) ,
- 90% of the survey area is under 91 m in depth (one of the Atlantic zone strata), thus the depth strata selected may not be the most suitable for our stratification.

These programs are designed to produce routine annual 'production type' analysis of this data set - bearing in mind the various assumptions of the survey design. The output of each species/year combination is used to build the historic yearly biomass estimates for calibration of our stock assessments. These surveys were originally designed to survey the southern Gulf cod (Gadus morhua) and American plaice (Hippoglossoides platessoides) stocks. These two stocks have been the only fisheries for which this data has been incorporated into the annual assessment process.

Program Compilation notes

All programs in the RVAN suite are written in Turbo Pascal (ver 3.0) and some utilize utilities from the Turbo Toolbox (eg. Turbo Sort). They also share many common "include" files. All the programs have been compiled to --.COM files for ease of use.

Turbo Pascal is available on CPM80, CPM86, MS/DOS and Apple MacIntosh operating systems. Some options (such as retrieving the date and time from the OS) have been included in the MS/DOS version. These have been marked and must be commented out for CPM80 and CPM86 versions or the programs will 'bomb'.

The program files (--.COM) and the necessary associate files (--.PAR, STRATA.DAT, etc.) require approximately 1 Mb of disk space. These files can conveniently be separated into four 360 Kb disks. One disk is used for each topic: editing, data listing, data analysis and plotting. Many of the programs produce data files and some produce intermediate temporary files for storage and sorting. At least 50 K (preferably 100 K) disk space should be free for a moderate sized cruise (30 to 50 sets).

Some additional utility files are used for creating command files for use with the commercial package 'SuperSort'. This is the method used to sort the data files and select subsets as required. These programs are written in Utah Fortran (ver 1.01). These small, single purpose programs are listed in Appendix I.

Many of these programs can be used with other similar data sets by simply substituting the appropriate format structure as an 'include' file. Batch files have been used to simplify procedures when more than one program is used to complete a task.

Program Utilization Notes

The programs are all interactive. The user is required to identify both themself and the data set to be used. Each analysis program uses a separate parameter file containing much of the information (detailed formatting, heading setups, data selection criteria) required to customize the output. For many programs several species and cruise combinations can be run together.

At the top of each report a program title including program version and data version number is output. Below this all programs output the header which is composed of a title, date and time, and name of person running the program. While this procedure may seem tedious it is necessary in order to maintain proper documentation and identification of runs and to keep separate 'official' or standard runs from 'research' runs.

The MALKey series of programs can generate a large number of temporary and permanent files depending on the cruise/species combinations. A CONFIG.SYS file of

```
Buffers = 20
Files   = 40
```

has been found adequate to date.

Each of the programs is run by simply typing the name and pressing the return key. The user then answers the interactive queries, many of which are used in completing the page headings on the output.

All data files are identified by cruise ID only and the appropriate name is constructed by the program. For example cruise 244 on the RV E.E. Prince uses P244 for the cruise ID and the biological data file would be RVP244B.DAT. The data file sequence of naming for the above file would be RVP244B.DAT for the keypunched data, RVP244B.NEW for the same data converted to the standardized format by AltCol, and RVP244B.DBA for the same data in the reduced format produced by BldBIO. The other three data types follow the same protocol except the 'B' in 'RVP244'+ B +'.DAT' is replaced by an 'S', 'C', or 'L' respectively for set, catch, and length. The standardized format, in addition to being converted to a single format, has zero filled values and some standardization of codes. The reduced formats are sorted at the time of reduction, the standardized formats are not - before running the analysis programs sorting in necessary.

AltCol

- program to standardize historical (1970 to 1983) and current (1984, 1985, 1986 to present) data into a single common standardized format.

```
program Alter_Columns;
{  program:      to add, delete or alter columns of existing research
                 vessel data files producing one standardized format

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   Author:       Douglas Clay             (506)-857-6218
                 Marine Fisheries Division
                 Gulf Fisheries Center, Moncton, N.B.
                 Department of Fisheries and Oceans

   Date_Written: 85/04/07          version 1.0
        Updated: 87/04/09                  2.0
                 87/04/30                  2.01
                 87/08/09                  2.02
                 87/08/18                  2.03
                 87/12/01                  2.04
                 88/04/06                  2.05
                 88/07/18                  2.06
                 88/08/20                  2.065

             list of include files (include files are self contained
                PrtConst            parts of the program on separate
                NewVal              files that are read into the program
                RvSETac             sequentially as listed)
                RvCATac
                RvLENac
                RvBIOac
                ChangeS
                ChangeC
                ChangeL
                ChangeB
                Exist
                HeadALT                               }

{                           DOCUMENTATION

     this program takes St. Andrews historic data and Gulf Region
     current data and creates one common data series
```

R esearch V essel AN alysis

The input data file is named with the following convention, 'RV' + Xnnn + T + '.DAT' and the standardized output file has a name in the form of 'RV' + Xnnn + T + '.NEW' where Xnnn is the cruise ID and T is a single letter representing the card type - S for set, C for catch, L for length and B for biological.

Version 2.0 adds the data version number to the set card

version 2.02 corrects function HowLong for individual data types
version 2.03 accounts for the 4 digit time in 1985 data P327
H141

version 2.04 corrects error in time duration calculation
version 2.05 corrects truncation of $\frac{\text{weight sampled}}{\text{weight caught}}$ ratio on Len card

and re-writes the set data (RVXnnnS.DAT file as RVXnnnS.VER) with new version number.

}

{ after running AltCol the data should be sorted as described below:

INPUT data should be sorted by these fields before running the edit program and the programs to reduce the data files:

data type:	SET	CATCH	LENGTH	BIOLOGICAL	columns
fields	set no.	set no.	set no.	set no.	9 to 11
		species			41 to 44
			species		22 to 25
				species	23 to 26
			sex		32
			start len		37 to 39
				fish no.	28 to 31
				record no.	27

}

INPUT data should be sorted by these fields before running the analyses programs:

data type:	SET	CATCH	LENGTH	BIOLOGICAL	columns
fields	set no.				9 to 11
		species			41 to 44
			species		22 to 25
				species	23 to 26
		set no.	set no.	set no.	9 to 11
			sex		32
			start len		37 to 39
				fish no.	28 to 31
				record no.	27

}

```
{   LIST OF PROPOSED DATA VERSION NUMBERS FOR RESEARCH VESSEL DATA

           number           description
           =========================================
           1.00             first keypunched version
           1.10             St. Andrews manual edit
           1.20             Gulf 'CHECK-IT' edit
           2.X0             Standardized format (.NEW)

                                                                }
```

This program requires two parameter files. The first is AltCol.PAR, it has the version number to be used on the first line. The second CruzYr.PAR has a list of valid cruise ID's and the year in which the survey was carried out (see Files - Utility).

AltCol.PAR

```
2.10  {data version number to be inserted - 0.00 defaults to existing}
NEW   {data type - first time conversion/OLD - updates version no./NEW}
```

LoranC2

- program to calculate the location in degrees, minutes, and seconds from Loran C readings.

```
program LoranC;

{ Program:         Loran C conversion to Lat and Long

                         R esearch
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                         AN alysis programs

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  Authority      Marine Fisheries Division
                 Gulf Fisheries Center, Moncton, N.B.
                 Department of Fisheries and Oceans

 Contract Author:         Pierre C. Brien
    (ver 1.0)             ISMT-Microcybernetics Ltd.
                          P.O. Box 3663
                          Halifax, N.S. B3J 3K6   (902)-425-6460

 Date_Written:   86/02    ver 1.0

 Function: This program converts LORAN C readings into Latitude and
           Longitude values. The program has been converted from
           a previous program written in HP model 85 BASIC. Where
           possible, variable names have been converted to have
           mnemonic value; other variable names have been left as is.
           Functions existing in the BASIC library but not
           present in the PASCAL math functions have been
           implemented as follows:

             Tan(X) using the identity Tan(X) := Sin(X) / Cos(X)

             ATN2(X,Y) the arcTangent of Y/X in the proper quadrant
               where X,Y are the rectangular coordinate position of
               a point. ATN2(X,Y) := arcTan(Y/X)

             RTD - Radians to degrees

             DTR - Degrees to radians
```

Changes made and problems encountered during conversion were as follows:

Loop counters - BASIC increments before testing whereas Pascal terminates with the control variable equal to the final value. See procedure ImproveSolution.

Unused variables - the statements using unused variables are commented out.

Local variables - variables used as local or temporary variables have been made local to the procedure or function using them.

Naming conventions - BASIC recognizes as different A and A(I) whereas Pascal considers this to be an error. Where this situation was encountered the array was renamed Aa (a for array) and the scalar was not changed. There is one exception to this rule: Those arrays used to store the station data are named Td (d for data).

Debugging and testing the program was done using a TRACE ALL printout from the BASIC program. The writeln statements used to produce comparable output have been left in place but are commented out. They may thus be reactivated easily should the need arise.

If it is desired to increase the number of stations stored on the data file this may be done up to a limit of 51 stations (from the present 44) without any structural changes to the program. The limit of 51 is derived from the maximum length of a string 255 (255 / 5 = 51). More then 51 stations may be stored by changing the way in which the Loran station IDs are stored and by writing a function to search the array rather than using the pos function as has been done.

```
            ******  end of documentation *******)

{               list of include files

                        exist.pas
                        DirSol.pas
                        RevSol.pas
                        Baseline.pas
                        Solution.pas         }
```

Notes to aid in the interpretation of program function.

The acronym **LORAN** means LOng Range Aid to Navigation.

Loran C is a long range navigation system that operates at an assigned frequency of 100 KHz. It uses pulsed signals from widely spaced transmitting stations and measures the difference in arrival times of the pulses to determine position relative to the transmitting stations. The time difference is the time of arrival of the secondary signal minus the time of arrival of the master signal, as observed on a single receiver.

The master station is the controlling station of the Loran C Chain which transmits the reference timing signals. The secondary station is any transmitting station in the chain that is not the master station. Secondaries are usually designated as W, X, Y, and Z and referenced to the master M station GRI. The GRI or Group Repetition Interval is a 4 digit number with a time coded delay which is used to identify the group of transmitter stations in a specified Loran C Chain. The chain is a group of Loran C transmitting stations identified by a specific GRI.

There are 12 GRI chains, these are:

Canadian east coast	5930	USA west coast	9940
Canadian west coast	5990	Gulf of Alaska	7960
Great lakes	8970	Norwegian Sea	7970
Northeast USA	9960	Mediterranean	7990
North Atlantic	7930	North Pacific	9990
Southeast USA	7980	Central Pacific	4990

An example of the Canadian east coast chain 5930 is:

STATION	PLACE NAME	LOCATION
Master station	Caribou, Maine	46 48 27.54 N 67 55 39.35 W
X Secondary station	Nantucket, Mass.	41 15 11.98 N 69 58 40.51 W
Y Secondary station	Cape Race, Nfld.	46 46 32.62 N 53 10 32.41 W
Z Secondary station	Fox Harbour, Labrador	52 22 35.11 N 55 42 31.35 W

Emission delay or time delay between master and each of the secondary stations is:

X	13131.88	u sec
Y	28754.93	u sec
Z	41594.56	u sec

The data file containing the necessary parameters to complete the triangulation calculations to change Loran readings to degrees, minutes and seconds is as follows:

```
4990X 15972.23 16.444395 -169.30312  20.144916 -155.53097
4990Y 34253.18 16.444395 -169.30312  28.234177 -178.17302
5930X 13131.88 46.48272  -67.553771  41.151193 -69.583909
5930Y 28755.02 46.48272  -67.553771  46.463218 -53.102816
5990X 13343.6  51.575878 -122.220224 55.262085 -131.151965
5990Y 28927.36 51.575878 -122.220224 47.034799 -119.44953
5990Z 42266.63 51.575878 -122.220224 50.362972 -127.212935
7930W 15068.02 59.591727 -45.102747  64.542658 -23.552175
7930X 27803.77 59.591727 -45.102747  62.175968 -7.042671
7930Z 48212.2  59.591727 -45.102747  46.463218 -53.102816
7960X 13804.45 63.194281 -142.48319  57.262021 -152.221122
7960Y 29651.14 63.194281 -142.48319  55.262085 -131.151965
```

Further reading is available in any operating manual of a LORAN unit or the Canadian Coast Guard report "Radio aids to Marine Navigation" Vol 28 No. 2-E. (Published annually.)

DataLst

- program to list data from four card types in detailed and summarized tabular form and to produce X-Y files for statistical analysis and plotting.

```
program DataLst;
{ Program:        Data List File Program

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                      AN alysis programs

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    Authority     Marine and Anadromous Fish Division
                  Gulf Fisheries Center, Moncton, N.B.
                  Department of Fisheries and Oceans

  Term Programmer:        Joe Myers (3 rd year computer science)
     (ver 1.0)            University of Moncton
                          Moncton , New Brunswick.

  Date_Written:   88/08                  version 1.0
                  88/12                          1.1

  Function: This routine is used to print out data reports on
            each of the 4 data files. The files used are RVXnnnB.NEW,
            RVXnnnL.NEW, RVXnnnC.NEW and RVXnnnS.NEW, where Xnnn is
            the cruise ID for a particular file. See the parameter
            file DataLst.PAR for parameter input.

            This program produces either full reports of data files
            or subset reports for specific species, sex codes and
            experiment types in these files. The SET card report is
            standard and will not vary. Full and subset reports exist
            for all other data files. Furthermore, the biological data
            report produces either a full or subset summary listing of
            this file. The full reports are printed out to the default
            files XnnnB.RPT, XnnnS.RPT, XnnnC.RPT and XnnnL.RPT,
            where Xnnn is the cruise ID, and the subset reports to
            XnnnBxxx.RPT, XnnnLxxx.RPT, XnnnCxxx.RPT and XnnnS.RPT,
            where xxx is a alphanumeric expression for species being
            selected. The summary biological reports are printed
            to files with extension .SUM.

            If a subset LENGTH report is specified, the program will
            prompt the user for specific length intervals.
            The user may select ALL for a full length report or one
            may give minimum and maximum interval values. A file
            containing the Longitude, Latitude and the number of fish
            in the length interval specified is printed to the file
```

```
        XnnnSpec.PTS in a format then used for plotting (where
        Xnnn is the cruise ID and Spec is the subset species code).

        This program will also print to the standard device LST:
        (printer) depending on options selected in a user defined
        parameter file (DataLst.PAR). This parameter file also
        contains the device locations of the BIO, SET, CAT, LEN,
        SPECIES and STRATA data files. It also lists selection
        information for SEX codes and EXPERIMENT types to be
        included in the generation of the report.

        The parameter file also contains printing and pagination
        information fields - RightMargin, LeftMargin, LinesPerPage
        and CharsPerLine;the user thus has the ability to select
        various paper sizes and pitch combinations without
        program modification.

        This program is long and quite complex for first time
        users or particularly for those wishing to modify this
        report generator for other data sets. To assist in
        this task, all the debug statements used in the initial
        writing have been left in place and can be turned on
        or off with single commands in the parameter file
        DataLst.PAR.

           ******  end of documentation *******}

{       list of include files

         rvBIOin.pas
         rvSETin.pas
         rvCATin.pas
         rvLENin.pas
         DataLst2.pas
         BinSrch.pas
         HeadLST.pas
         GetDate.pas
         Exist.pas
         DataLst3.pas
         Getpar.pas
         DataLst4.pas
         ReportB.pas
         ReportS.pas
         ReportC.pas
         ReportL.pas
         DataLst5.pas           }
```

A parameter file DataLst.PAR is required to identify many of the options to be selected for a particular report. These options handle report selection and formatting of the output. For future modifications debug statements have been left in the program. The last three options in this parameter file are the switches for these debug statements.

```
C:             ;drive for RVXnnnS.NEW
C:             ;drive for RVXnnnC.NEW
C:             ;drive for RVXnnnL.NEW
C:             ;drive for RVXnnnB.NEW
C:             ;drive for Species.DBA and CheckIT.spp
C:             ;drive for Strata.DAT
*              ;SexCodes to process *=all or 1,2,3
1,2,3          ;Experiment Type valid = 1,2,3
y              ;Y/N do biological summary report    (Yes/No)
y              ;Y/N do biological detailed report
y              ;Y/N output bio detailed report to file (n if no report)
n              ;Y/N output bio detailed report to printer (  "    "   )
n              ;Y/N output set    report to printer  |
n              ;Y/N output catch  report to printer   }these reports always
n              ;Y/N output length report to printer  |   go to file
y              ;Y/N Subset report only (same species,sex,experiment type)
7              ;right margin
7              ;left margin
100            ;lines per page
100            ;cols per line
N              ;Y/N deBug_1 for tracing of data files being read
N              ;Y/N deBug_2 for tracing of errors
N              ;Y/N deBug_3 for tracing accumulations of frequencies
```

This program is often used in association with CheckIT. It is important to remember that the double carriage return used at the end of CheckIT **must** be removed before use by other programs.

All reports written to file go to the default drive.

To produce reports in various orders, ie. by species, by set, by strata it is necessary to sort the data files in the desired order.

BioFreq

- program to summarize the sampled (detailed) fish by strata and produce X-Y files for statistical analysis and plotting.

```
program BioFreqDist;
{ Program:       Biological data file Frequency Distributions


                      R esearch
                      V essel
                      AN alysis programs

  Scientific      Douglas Clay                         (506)-857-6218
   Authority      Marine Fisheries Division
                  Gulf Fisheries Center, Moncton, N.B.
                  Department of Fisheries and Oceans

  Contract Author:            Pierre C. Brien
    (ver 1.0)                 ISMT-Microcybernetics Ltd.
                              P.O. Box 3663
                              Halifax, N.S. B3J 3K6  (902)-425-6460

  Term Programmer:            Joe Myers (3 rd year computer science)
    (ver 3.0)                 University of Moncton
                              Moncton , New Brunswick.

  Date_Written:   84/10                  version 1.0
                  85/02                  version 2.0
                  87/04                  version 2.1
                  88/07                  version 3.0

  Function: This routine is used to accumulate and print the
            frequency distributions of 4 variables. The files used
            are 'RV'+ Xnnn +'B.NEW', 'RV'+ Xnnn +'S.NEW' where Xnnn
            is the Cruise ID for a particular file. See the parameter
            file BioFreq.PAR for input options.

            This program will print to a user specified file and/or
            to the standard LST: device depending on directives in
            a user specified parameter file (BioFreq.PAR). This
            parameter file contains the drive locations of the BIO and
            SET data files as well as the output files if required.
            It also lists selection information for SEX codes and
            EXPERIMENT types to be included in the analysis. The user
            may select which variables are to be used and if the age
            and weight files are selected then a further option exists
            to have files of x and y values written for age/length
            and Length/Weight. The XY files are output in a format
            suitable for a regression program and come complete with
            titles and program control cards. The file names are of
```

```
          the form XnnnSpec.XYA and XnnnSpec.XYW where Xnnn is the
          Cruise ID and Spec is the 4 digit numeric species code ID.

          The parameter file also contains printing and pagination
          information fields - RightMargin, LeftMargin, LinesPerPage
          and CharsPerLine; from these fields the program will
          compute the ColPerPage field which determines the number
          of Frequency Columns which will be printed across each
          line. The user thus has the ability to select for various
          paper sizes and pitch combinations without program
          modification.

              ******  end of documentation *******}


{ list of include files

      rvBIOin.pas
      rvSETin.pas
      BioFreq2.pas
      BinSrch.pas
      HeadFRQ.pas
      GetDate.pas
      Exist.pas
      BioFreq3.Pas
      BioFreq4.pas
      BioFreq5.pas
      Getpar.pas
      BioFreq6.pas   }
```

A parameter file BioFreq.PAR is required to identify many of the options to be selected. These options handle data type selection and formatting of the output. For future modifications debug statements have been left in the program. The last three options in this parameter file are the switches for these debug statements.

```
BioFreq.lst     ;printed output file for BioFreq   N  for none
n               ;output to printer Y/N
d:              ;drive for RVXnnnB.NEW
d:              ;drive for RVXnnnS.NEW
C:              ;drive for Species.DBA
C:              ;drive for Strata.DAT
C:              ;drive destination for XY and Sex ratio files
*               ;SexCodes to process *=all or 1,2,3
1,2,3           ;Experiment Type valid = 1,2,3
n               ;Y/N  do maturity statistics
n               ;Y/N  do length statistics
nn              ;Y/N  do age statistics    / Y/N write Len Age xy file
yy              ;Y/N  do weight statistics / Y/N write Len Wght xy file
n               ;Y/N  sex ratio file MALES/(MALES+FEMALES) by length
7               ;right margin
7               ;left margin
50              ;lines per page
132             ;cols per line
n               ;Y/N deBug_1 for tracing of data files being read
n               ;Y/N deBug_2 for tracing of errors
n               ;Y/N deBug_3 for tracing accumulations of frequencies
```

Notes: The file name for the output canNOT have an 'n ' (that is an 'n' followed by a blank) in the name. The 'n' for none must start in column 1 and cannot be the word 'none'.

If your printer does not have a buffer, sending output to it will extend the running time considerably. A faster routine would be to send the output to a file and use the MS-DOS command PRINT to list it on your printer.

CheckIT

- **program to edit data in the standardized '.NEW' format for both internal consistency and data range limits. A user guide is provided in Appendix II.**

```
program CheckIT;
{ Program:        Data Checking and Validation

                      R esearch
                      V essel
                      AN alysis programs

  Scientific      Douglas Clay                    (506)-857-6218
   Authority      Marine Fisheries Division
                  Gulf Fisheries center, Moncton, N.B.
                  Department of Fisheries and Oceans


  Contract Author:         Pierre C. Brien
    (ver 1.0)              ISMT-Microcybernetics Ltd.
                           P.O. Box 3663
                           Halifax, N.S. B3J 3K6  (902)-425-6460

  Term Programmer:         Joe Myers  (3 rd year computer science)
    (ver 3.0)              University of Moncton
                           Moncton , New Brunswick.


  Date_Written:   85/10
                  86/11/17        modifications marked as       (1.1)
                 {88/05/25             "           "    "       (3.0)
                 {88/08/30             "           "    "       (3.1)
                 {88/11/28             "           "    "       (3.12)

 {Function: This program is designed as a general purpose data
            validation program for ASCII files. The files to be
            validated are defined variable by variable and a
            series of checks can be carried out on each variable.
            Variables are identified by name and the column location
            is specified as well as a variable type.

            This specific application is used to edit the research
            vessel data collected by the Gulf Region of the DFO. This
            implimentation can edit data from 1970 to present after
            the format has been standardized by AltCol to the '.NEW'
            form. Additional checks could be added and the implimented
            checks turned on or off for special cruises.
```

The file nomenclature has been imbedded in the source code and follows the style 'RV'+ Xnnn +'T.NEW' where Xnnn is the cruise ID and T is the card or data type (S for set, C for catch, L for length, and B for biological).

This program is long and complex for first time users or particularly for those wishing to modify this edit system for other data sets. To assist in this task all the debug statements used in the initial writing have been left in place and can be turned on or off with single commands in the parameter file, CheckIT.PAR.

Version 3.0 has added additional checks and a concept of visual checks and report generation is associated with the programs BioFreq and DataLst.

Current version 3.1 at end of summer student Joe Myers' term.

****** end of documentation *******}

{ It is necessary to ensure the data files are sorted in the correct order prior to running each test. The tests have been ordered in such a way that each test follows logically and each test should be run and the corrections made before the next is run. Many errors will be found by more than one test. The tests are also grouped by sorting order. The sorting order is found below (this is a copy of the 'on screen' menu presented at the beginning of each run).

```
      T e s t                       D e f a u l t      S o r t
                                    F i l e            O r d e r

  1) Range Test    ............     Range.PAR    SORTED:SET/SPEC/FISH_NO
  2) Set Validation  ..........     Set.PAR           "
  3) Catch Validation  ........     Cat.PAR           "
  4) Set/Catch Validation .....     SetCat.PAR        "
  5) Bio/Catch Validation .....     BioCat.PAR        "
  6) Len/Catch Validation .....     LenCat.PAR   SORTED:SPEC/SET/FISH_NO
  7) Biological Validation ....     Bio.PAR      SORTED:SPEC/FISH_NO/SET
  8) Regression Test ..........     Reg.PAR           "
  9) Report  ..................     run DataLst
 10) Plot Data   ..............     run DataLst & BioFreq
 99) EXIT    ..................     return to DOS
                                                                  }
```

```
{       list of INCLUDE files

                        Chkconst.pas
                        CheckIT1.pas
                        Exist.pas
                        GetDate.pas
                        HeadChk.pas
                        CheckIT2.Pas
                        CheckIT3.Pas
                        CheckIT4.Pas
                        CheckIT5.Pas
                        CheckIT6.Pas
                        CheckIT7.pas
                        Getpar.pas                                  }
```

A parameter file CheckIT.PAR is required to identify many of the options to be selected for a particular run of a data set. These options handle formatting of the output, acceptable error levels, and the toggle switches for the debug statements.

```
LST:                    :  output file name   lst:  =  printer
d:                      :  bioDrive          'RV'+ Xnnn +'B.NEW'
d:                      :  lenDrive
d:                      :  catDrive
d:                      :  setDrive
c:                      :  speciesDrive       CheckIT.SPP
c:                      :  strataDrive        STRATA.DAT
                        :  PrintOptions
4                       :  RightMargin
4                       :  LeftMargin
60                      :  LinesPerPage
80                      :  CharPerLine
0.25                    :  RegFuzzFactor for SPdistance
0.35                    :  RegFuzzFactorW for L/W regression test
0.10                    :  RegFuzzFactorL for L/W regression test
0.9                     :  SetCatLow  {Set Catch Validation acceptable
1.1                     :  SetCatHigh  wght ratio range as Catch/Set}
0.01                    :  Tolerance
N                       :  deBug1     Y/N  audit for line by line reading
N                       :  deBug2     Y/N  tracing set and species
N                       :  deBug3     Y/N  audit of regression
N                       :  deBug4     Y/N  invert listing
```

User documentation for running the CheckIT system is available in Appendix II.

CheckIT con't on following pages

A further 13 parameter files are necessary for the entire edit system to operate; however, not all are required for every test. These files follow.

parameter file **SETIN.PAR** contains the format structure for the first (set) card type.

```
/VARLIST  Name=SETDATA
 CARD_TYPE,    1,1,I/                 {SETCAT}
 CRUISE,       +,4,C/
 STATION,      +,3,I/
 SET_NO,       +,3,I/                  {V1}
 DATEDAY,      +,2,I/
 DATEMON,      +,2,I/
 DATEYR,       +,2,I/
 ICNAF_NAFO,   +,3,I/
 EXPERIMENT,   +,1,I/
 TIME_BEG,     +,4,I/
 TIME_DUR,     +,2,I/
 GEAR,         +,3,I/
 AUX,          +,1,I/
 SPEED,        +,3,I/
 OBTAIN,       +,1,I/
 LATITUDE,     +,4,I/
 LONGITUDE,    +,4,I/
 DEPTH_AVE,    +,3,I/
 DEPTH_RAN,    +,2,I/
 DISTANCE,     +,2,I/
 SOURCE,       +,1,I/
 WIND_DIR,     +,1,I/
 WIND_FORCE,   +,1,I/
 TIDE,         +,1,I/
 TEMP_SUR,     +,3,I/
 TEMP_BOT,     +,3,I/
 SALIN_BOT,    +,3,I/
 LIGHT,        +,3,I/
 BT_SLIDE,     +,3,I/
 HYDRO_STN,    +,3,I/
 BOTTOM,       +,1,I/
 NO_FISH,      +,2,I/                  {V2}
 NO_INVERTS,   +,2,I/                  {V3}
 WEIGHT_CAT,   +,4,R/                  {V4}
 VER_DAT,      +,4,R/
```

The variables indicated by V1, V2, etc. are the code names used in the program itself for the test listed above, in this case the SETCAT test (test #4).

parameter file **CATIN.PAR** contains the format structure for the second (catch) card type.

```
/VARLIST  Name=CATDATA
 CARD_TYPE,    1,1,I/                   {LENCAT}   {SETCAT}   {BIOCAT}
 CRUISE,       +,4,C/
 STATION,      +,3,I/
 SET_NO,       +,3,I/                     {V1}       {V1}       {V1}
 DATEDAY,      +,2,I/
 DATEMON,      +,2,I/
 DATEYR,       +,2,I/
 ICNAF_NAFO,   +,3,I/
 EXPERIMENT,   +,1,I/
 TIME_BEG,     +,4,I/
 TIME_DUR,     +,2,I/
 DEPTH_GEAR,   +,3,I/
 TEMP_GEAR,    +,3,I/
 SALIN_GEAR,   +,3,I/
 LIGHT,        +,3,I/
 BOTTOM,       +,1,I/
 SPECIES,      +,4,I/                     {V2}       {V2}       {V2}
 NUMBER_SP,    +,5,I/                     {V4}       {V3}
 WEIGHT_SP,    +,4,R/                     {V5}       {V4}
 BASKET_SP,    +,4,R/
 NO_LENGTH,    +,4,I/                     {V3}
 SEX,          +,4,I/                                           {V3}
 MATURITY,     +,3,I/                                           {V4}
 WEIGHT,       +,3,I/                                           {V5}
 OTOLITHS,     +,3,I/                                           {V6}
 PARISITES,    +,3,I/
 STOMACH,      +,3,I/
 FREE,         +,3,I/
 WEIGHT_CAL,   +,1,I/
```

parameter file **LENIN.PAR** contains the format structure for the third (length frequency) card type.

```
/VARLIST  Name=LENDATA
 CARD_TYPE,   1,1,I/                 {LENCAT}
 CRUISE,      +,4,C/
 STATION,     +,3,I/
 SET_NO,      +,3,I/                   {V1}
 DATEDAY,     +,2,I/
 DATEMON,     +,2,I/
 DATEYR,      +,2,I/
 ICNAF_NAFO,  +,3,I/
 EXPERIMENT,  +,1,I/
 SPECIES,     +,4,I/                   {V2}
 NO_SAMPLED,  +,4,I/                   {V6}
 RATIO,       +,2,R/                   {V7}
 SEX,         +,1,I/                   {V8}
 FREE,        +,2,I/
 RECORD_NO,   +,1,I/
 GROUPING,    +,1,I/                   {V3}
 START_LEN,   +,3,I/                   {V4}
 LEN1,        +,3,I/                   {V5}
 LEN2,        +,3,I/
 LEN3,        +,3,I/
 LEN4,        +,3,I/
 LEN5,        +,3,I/
 LEN6,        +,3,I/
 LEN7,        +,3,I/
 LEN8,        +,3,I/
 LEN9,        +,3,I/
 LEN10,       +,3,I/
 LEN11,       +,3,I/
 LEN12,       +,3,I/
 LEN13,       +,3,I/
 LEN14,       +,3,I/
```

parameter file **BIOIN.PAR** contains the format structure for the fourth (biological) card type.

```
/VarList  Name=BioData
 CARD_TYPE,    1,1,I/      {BIO}      {BIOCAT}   {LENCAT}   {REGRESSION}
 CRUISE,       +,4,C/
 STATION,      +,3,I/
 SET_NO,       +,3,I/       {V8}       {V1}       {V1}         {V5}
 DATEDAY,      +,2,I/
 DATEMON,      +,2,I/       {V4}
 DATEYR,       +,2,I/       {V2}
 ICNAF_NAFO,   +,3,I/
 EXPERIMENT,   +,1,I/
 BOTTOM,       +,1,I/
 SPECIES,      +,4,I/       {V7}       {V2}       {V2}         {V1}
 RECORD_NO,    +,1,I/      {V10}                  {V3}
 FISH_NO,      +,4,I/       {V9}                               {V6}
 LENGTH,       +,3,R/                             {V4}         {V2}
 SEX,          +,1,I/                  {V3}                    {V7}
 MATURITY,     +,1,I/                  {V4}                    {V8}
 WEIGHT,       +,5,R/                  {V5}                    {V4}
 STOMACH_CON,  +,1,I/
 ST_VOLUME,    +,5,R/
 ST_NO_SPEC,   +,2,I/
 ST_PART,      +,2,I/
 ST_SP_CODE,   +,4,I/
 AGE_MATL,     +,1,I/                  {V6}
 AGE_ANNULI,   +,2,I/       {V6}
 AGE_EDGE,     +,1,I/       {V5}
 AGE_CHECK,    +,3,I/
 AGE,          +,2,R/       {V3}                               {V3}
 YEAR_CLASS,   +,2,I/       {V1}
 AGER,         +,1,C/
 PARASITE,     +,3,I/
 FEILD_DEFN,   +,6,R/
```

parameter file **SPECIES.PAR** contains the format structure for the species code file.

```
/VARLIST  Name=Species, Lines=3
 Species,     1,4,I/
 Divisor,     +,4,I/
 AMWGT,       11,9,R/
 BMWGT,       21,9,R/
 AFWGT,       31,9,R/
 BFWGT,       41,9,R/
 ACWGT,       51,9,R/
 BCWGT,       61,9,R/
 AMAGE,       11,9,R/
 BMAGE,       21,9,R/
 AFAGE,       31,9,R/
 BFAGE,       41,9,R/
 ACAGE,       51,9,R/
 BCAGE,       61,9,R/
```

parameter file **Range.PAR** contains the list of each range or group of values that individual variables will be tested against

```
/VALUES
  VAL1,I(1,2)
  AGE_MAT,I(0,1,9)
  L_TYPE,I(0,999)
  GEAR_TYPE,I(3,8,9,12,13)
  SPECIES,I,FROM('CheckIT.SPP',1,3,1,4)
  STRAT,I,FROM('Strata.DAT',1,1,1,3)
  CDTY5,I(5)
  CDTY6,I(6)
  CDTY7,I(7)
  CDTY8,I(8)
/RANGES
  DAYS,I(1,31)
  MONTHS,I(1,12)
  YEARS,I(70,88)
  NAFO_RNG,I(431,439)
  EXP_VALID,I(1,3)
  BOT_TYPE,I(1,5,9,9)
  SEX,I(0,2,9,9)
  SEX_LEN,I(0,4,9,9)
  MAT_RNG,I(0,9)
  T_BEG,I(1,2400)
  T_DUR,I(20,40)
  NOSP_RNG,I(1,20)
  REC_LEN,I(0,9)
  GROUP_RNG,I(1,3)
  SPEED_RNG,I(20,30)
  LAT_RNG,I(4515,4900)
  LONG_RNG,I(6000,6600)
  DEP_AVE,I(10,200)
  DEP_RAN,I(0,20)
  DIST_RNG,I(10,15)
  TEMP_SUR,I(-5,220)
  NOFISH_RNG,I(1,20)
  NOINVERTS,I(0,10)
/PRINT VALUES VARIABLES FILES
                                  what follows (without these spaces)
                                  are the variables on each of the four
                                  card types and the test and test
                                  values to be applied
/VARLIST  Name=SETDATA
 CARD_TYPE,    1,1,I,CHECKS=CDTY5/
 CRUISE,       +,4,C/
 STATION,      +,3,I,CHECKS=STRAT/
 SET_NO,       +,3,I/
 DATEDAY,      +,2,I,CHECKS=DAYS/
 DATEMON,      +,2,I,CHECKS=MONTHS/
 DATEYR,       +,2,I,CHECKS=YEARS/
 ICNAF_NAFO,   +,3,I,CHECKS=NAFO_RNG/
```

```
  EXPERIMENT,   +,1,I,CHECKS=EXP_VALID/
  TIME_BEG,     +,4,I,CHECKS=T_BEG/
  TIME_DUR,     +,2,I,CHECKS=T_DUR/
  GEAR,         +,3,I,CHECKS=GEAR_TYPE/
  AUX,          +,1,I/
  SPEED,        +,3,I,CHECKS=SPEED_RNG/
  OBTAIN,       +,1,I/
  LATITUDE,     +,4,I,CHECKS=LAT_RNG/
  LONGITUDE,    +,4,I,CHECKS=LONG_RNG/
  DEPTH_AVE,    +,3,I,CHECKS=DEP_AVE/
  DEPTH_RAN,    +,2,I,CHECKS=DEP_RAN/
  DISTANCE,     +,2,I,CHECKS=DIST_RNG/
  SOURCE,       +,1,I/
  WIND_DIR,     +,1,I/
  WIND_FORCE,   +,1,I/
  TIDE,         +,1,I/
  TEMP_SUR,     +,3,I,CHECKS=TEMP_SUR/
  TEMP_BOT,     +,3,I/
  SALIN_BOT,    +,3,I/
  LIGHT,        +,3,I,CHECKS=L_TYPE/
  BT_SLIDE,     +,3,I/
  HYDRO_STN,    +,3,I/
  BOTTOM,       +,1,I,CHECKS=BOT_TYPE/
  NO_FISH,      +,2,I,CHECKS=NOFISH_RNG/
  NO_INVERTS,   +,2,I,CHECKS=NOINVERTS/
  WEIGHT_CAT,   +,4,I/
  VER_DAT,      +,4,R/
/Test name=SETDATA, file='default.fil'
/VARLIST  Name=CATDATA
  CARD_TYPE,    1,1,I,CHECKS=CDTY6/
  CRUISE,       +,4,C/
  STATION,      +,3,I,CHECKS=STRAT/
  SET_NO,       +,3,I/
  DATEDAY,      +,2,I,CHECKS=DAYS/
  DATEMON,      +,2,I,CHECKS=MONTHS/
  DATEYR,       +,2,I,CHECKS=YEARS/
  ICNAF_NAFO,   +,3,I,CHECKS=NAFO_RNG/
  EXPERIMENT,   +,1,I,CHECKS=EXP_VALID/
  TIME_BEG,     +,4,I,CHECKS=T_BEG/
  TIME_DUR,     +,2,I,CHECKS=T_DUR/
  DEPTH_GEAR,   +,3,I/
  TEMP_GEAR,    +,3,I/
  SALIN_GEAR,   +,3,I/
  LIGHT,        +,3,I,CHECKS=L_TYPE/
  BOTTOM,       +,1,I,CHECKS=BOT_TYPE/
  SPECIES,      +,4,I,CHECKS=SPECIES/
  NUMBER_SP,    +,5,R/
  WEIGHT_SP,    +,4,R/
  BASKET_SP,    +,4,R/
  NO_LENGTH,    +,4,I/
  SEX,          +,4,I/
  MATURITY,     +,3,I/
  WEIGHT,       +,3,I/
  OTOLITHS,     +,3,I/
  PARISITES,    +,3,I/
  STOMACH,      +,3,I/
  FREE,         +,3,I/
  WEIGHT_CAL,   +,1,I/
 /TEST NAME=CATDATA, FILE='default.fil'
 /VARLIST  Name=LENDATA
  CARD_TYPE,    1,1,I,CHECKS=CDTY7/
  CRUISE,       +,4,C/
  STATION,      +,3,I,CHECKS=STRAT/
  SET_NO,       +,3,I/
  DATEDAY,      +,2,I,CHECKS=DAYS/
  DATEMON,      +,2,I,CHECKS=MONTHS/
  DATEYR,       +,2,I,CHECKS=YEARS/
  ICNAF_NAFO,   +,3,I,CHECKS=NAFO_RNG/
  EXPERIMENT,   +,1,I,CHECKS=EXP_VALID/
  SPECIES,      +,4,I,CHECKS=SPECIES/
  NO_SAMPLED,   +,4,I/
  RATIO,        +,2,R/
  SEX,          +,1,I,CHECKS=SEX_LEN/
  FREE,         +,2,I/
  RECORD_NO,    +,1,I,CHECKS=REC_LEN/
  GROUPING,     +,1,I,CHECKS=GROUP_RNG/
  START_LEN,    +,3,I/
  LEN1,         +,3,I/
  LEN2,         +,3,I/
  LEN3,         +,3,I/
  LEN4,         +,3,I/
  LEN5,         +,3,I/
  LEN6,         +,3,I/
  LEN7,         +,3,I/
  LEN8,         +,3,I/
  LEN9,         +,3,I/
  LEN10,        +,3,I/
  LEN11,        +,3,I/
  LEN12,        +,3,I/
  LEN13,        +,3,I/
  LEN14,        +,3,I/
 /TEST NAME=LENDATA, FILE='default.fil'
 /VarList  Name=BioData
  CARD_TYPE,    1,1,I,CHECKS=CDTY8/
  CRUISE,       +,4,C/
  STATION,      +,3,I,CHECKS=STRAT/
  SET_NO,       +,3,I/
  DATEDAY,      +,2,I,CHECKS=DAYS/
  DATEMON,      +,2,I,CHECKS=MONTHS/
  DATEYR,       +,2,I,CHECKS=YEARS/
  ICNAF_NAFO,   +,3,I,CHECKS=NAFO_RNG/
  EXPERIMENT,   +,1,I,CHECKS=EXP_VALID/
  BOTTOM,       +,1,I.CHECKS=BOT_TYPE/
  SPECIES,      +,4,I,CHECKS=SPECIES/
  RECORD_NO,    +,1,I,CHECKS=VAL1/
  FISH_NO,      +,4,I/
  LENGTH,       +,3,I/
  SEX,          +,1,I,CHECKS=SEX/
  MATURITY,     +,1,I,CHECKS=MAT_RNG/
  WEIGHT,       +,5,R/
 STOMACH_CON, +,1,I/
 ST_VOLUME,   +,5,R/
 ST_NO_SPEC,  +,2,I/
 ST_PART,     +,2,I/
 ST_SP_CODE,  +,4,I/
 AGE_MATERIAL,+,1,I,CHECKS=AGE_MAT/
 AGE_ANNULI,  +,2,I/
 AGE_EDGE,    +,1,I/
 AGE_CHECK,   +,3,I/
 AGE,         +,2,I/
 YEAR_CLASS,  +,2,I/
 AGER,        +,1,C/
 PARASITE,    +,3,I/
 FEILD_DEFN,  +,6,R/
/TEST  NAME=BIODATA, FILE='default.fil'
/CLOSE
```

parameter file **SET.PAR** contains the format structure for the first (set) card type and the instruction to carry out the special test for distance checking.

```
/VARLIST  Name=SETDATA
 TIME_DUR,     26,2,R/
 SPEED,        32,3,R1/
 DISTANCE,     49,2,R1/
 DUMMY,        49,2,C,checks=SpDistance/
/Test  Name=SETDATA, File='default.fil'
/Close
```

parameter file **CAT.PAR** contains the format structure for the second (catch) card type and the instruction to carry out the special test for distance checking.

```
/VARLIST  Name=CATDATA
 NUMBER_SP,   45,5,I/
 NO_LENGTH,   58,4,I/
 SEX,         +,4,I/
 MATURITY,    +,3,I/
 WEIGHT,      +,3,I/
 OTOLITHS,    +,3,I/
 PARASITES,   +,3,I/
 STOMACH,     +,3,I/
 DUMMY,       +,1,C,checks=SpNomeas/
/Test  Name=CATDATA File='default.fil'
/Close
```

parameter file **SetCat.PAR** contains the instructions to read the first (set) and second (catch) card types and carry out the test for 'setcatch'.

```
/READ FILE=SetIN.PAR
/READ FILE=CatIN.PAR
/VALIDATE
  SETCATCH,SET=SETDATA='DEFAULT.FIL',CAT=CATDATA='DEFAULT.FIL'/
```

parameter file **BioCat.PAR** contains the instructions to read the second (catch) and fourth (biological) card types and carry out the test for 'biocatch'.

```
/READ FILE=CatIN.PAR
/READ FILE=BioIN.PAR
/Validate
  BioCatch,Bio=BIODATA='default.fil',Cat=CATDATA='default.fil'/
/Close
```

parameter file **LenCat.PAR** contains the format for reading the file CheckIT.SPP containing the sex specific regression coefficients (a & b) for a length weight relationship and the instructions to read the second (catch), third (length), and fourth (biological) card types and carry out the test for 'length'.

```
/VARLIST  Name=Species, Lines=3
 Species,     1,4,I/
 Divisor,     +,4,I/
 AMWGT,       11,9,R/
 BMWGT,       21,9,R/
 AFWGT,       31,9,R/
 BFWGT,       41,9,R/
 ACWGT,       51,9,R/
 BCWGT,       61,9,R/
 AMAGE,       11,9,R/
 BMAGE,       21,9,R/
 AFAGE,       31,9,R/
 BFAGE,       41,9,R/
 ACAGE,       51,9,R/
 BCAGE,       61,9,R/
/Set sex=COMBINED
/Read file=LenIN.PAR
/Read file=CatIN.PAR
/Read file=BioIN.PAR
/Validate
  Length,species=species='default.fil',Len=LENDATA='default.fil',
        Cat=CATDATA='default.fil', Bio=BIODATA='default.fil'/
```

parameter file **Bio.PAR** contains the instructions to read the fourth (biological) card type and carry out the test for 'biological'.

```
/Read file=BioIN.PAR
/VALIDATE
  biological,bio=BIODATA='default.fil'
```

parameter file **Reg.PAR** contains the instructions to read the fourth (biological) card type and the species file CheckIT.SPP and carry out the test for 'regression'. The toggle switches for sex and for length and weight or length and age are in this parameter file.

```
/Read  file=Species.PAR
/Read  file=BioIN.PAR
/Set   TESTWEIGHT=ON, TESTAGE=OFF
/Set   SEX=COMBINED
/Print files
/Validate
  Regress,Bio=BIODATA='default.fil',species=Species='CheckIT.SPP'/
```

CheckIT is the main program of this RV edit system. Other components of the system are several short Fortran programs which produce command files for use with the commercial sort package 'SuperSort' and a series of batch programs to link various aspects of the system together (see Appendix I for listings of these components).

BldXXX

- **four programs to build smaller reduced data sets (*.DBA files) with all the data required for use by the statistical programs CatStat and MALKey1,2,& 3 and the mapping program CatMap.**

  The original versions of these statistical programs used the reduced data files produced by this set of 'build' programs. However, with the advances in computer storage capacity, the analysis programs were modified to use the entire data files (*.NEW files). The 'BUILD' programs are available to produce a reduced data set for individual analysis involving the catch, length, and biological data sets. The set file when 'built' with BldSET is an indexed file used by all the analysis programs.

The original program was a single generic version which had to be compiled each time for building a data set from a different card type. A series of 3 uppercase X's are located throughout the program whenever a change is required. Using a 'global change' the 'XXX' can be substituted by SET, CAT, LEN, or BIO. The program can then be recompiled to build the specific file in question. To simplify the operation each program has been converted and maintained in its own file space.

Generic Program BldXXX.pas **Build Bio,Cat,Len and Set**

```
program Build_XXX_Rec_File;
{ Program:         Build Data base files for

                      R esearch
                      V essel
                      AN alysis programs

  Scientific      Douglas Clay                      (506)-857-6218
   Authority      Marine Fisheries Division
                  Gulf Fisheries Center, Moncton, N.B.
                  Department of Fisheries and Oceans

  Contract Author:      Pierre C. Brien
     (ver 1.0)          ISMT-Microcybernetics Ltd.
                        P.O. Box 3663
                        Halifax, N.S. B3J 3K6  (902)-425-6460

  Date_Written:   85/02    version 1.0
                  85/10    version 2.0
                  86/01    version 2.1   modifications marked as {2.1}

{ Function: This routine is a generalized routine to build the 4
            data base files and associated indexes. To create the
```

appropriate program just replace all occurences of XXX by the characters BIO, CAT, LEN or SET and compile the program.

Ensure that any change made to any of the data type specific include files is propagated to all other such files. These files can be identified in the text because they contain the string BIO CAT LEN or SET.

85/07/12 - this routine has been modified so as to eliminate all need for Turbo Access files, no files are indexed and only the SET file is a relative file using SET NO as the relative key. All other files will be read and rewritten as sequential ASCII files with CRUISE, STRATUM, and set specific header information left off. This modification is being made to eliminate disk space problems caused by the size of the files and index files with the turbo access system.

The files are sorted using TURBO SORT,
    the Set file by set number and
    the Cat Len and Bio data types on species and set no.

    ****** end of documentation *******)

```
{            list of include files
                   PrtConst
                   RvXXXin             note the XXX will be replaced
                   RvXXXstr            by SET CAT LEN BIO when compiled
                   Sort.box            TURBO SORT routine
                   XXXInStr
                   Exist
                   HeadBld                               }
```

Note:- In version 1.0 all files were indexed for speedy access. These indexed files required more space than was saved by building the smaller files and therefore version 2.0 dropped indexing for all but the station and set card files.

Example of Build file: BldSET

```
program Build_SET_Rec_File;
{ Program:        Build Data base files for

                      R esearch
                      V essel
                      AN alysis programs

  Scientific      Douglas Clay                    (506)-857-6218
   Authortity     Marine Fisheries Division
                  Gulf Fisheries Center, Moncton, N.B.
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  Contract Author:        Pierre C. Brien
     (ver 1.0)            ISMT-Microcybernetics Ltd.
                          P.O. Box 3663
                          Halifax, N.S. B3J 3K6 (902)-425-6460

  Date_Written:   85/02    version 1.0
                  85/10    version 2.0
                  86/01    version 2.1   modifications marked as {2.1}
{                 86/03    version 2.2        "         "    "  {2.2}
{                 87/04    version 2.3        "         "    "  {2.3}

{ Function: This routine is a generalized routine to build the 4
            data base files and associated indexes. To create the
            appropriate program just replace all occurences of XXX by
            the characters BIO, CAT, LEN or SET and compile the program.

            This ensures that any change made to any of the file specific
            include files is propagated to all other such files.
            These files can be identified in the text because they
            contain the string BIO CAT LEN or SET.

            85/07/12 - this routine has been modified to eliminate
            all need for Turbo Access files, no files are indexed and
            the SET file is the only relative file, with SET NO as the
            relative key. All other files will be read and rewritten as
            sequential ASCII files with CRUISE, STRATUM, and set specific
            header information left off. This modification is being
            made to eliminate disk space problems caused by the size of
            the files and index files with the turbo access system.

            The files are sorted using TURBO SORT,
               the Set file by SET NO and
               the Cat Len and Bio data files on SPECIES and SET NO.
               The Bio file is also sorted on fish number.
            Version 2.2 allowed relative files from set cards to be
            built relative to sequential set number rather than
            actual set number.

            Version 2.3 allows the use of the new data format and
            includes the data version number.

                ******  end of documentation *******}

{  INPUT data is generally sorted by the following fields by the
         time the user is ready to run build:

 data type:     SET     CATCH     LENGTH      BIOLOGICAL     columns
              set no. set no.    set no.        set no.       9 to 11
                       species                               41 to 44
                                  species                    22 to 25
                                                species      23 to 26
                                  sex                        32
                                  start len                  37 to 39
                                                fish no.     28 to 31
                                                record no.   27
                                                                     }

   The data is sorted to the following form in the reduced data files
and must be sorted like this before running the analyses programs:

  data type:    SET     CATCH     LENGTH      BIOLOGICAL     columns

  fields     set no.                                          9 to 11
                      species                                41 to 44
                                 species                     22 to 25
                                               species       23 to 26
                      set no.    set no.       set no.        9 to 11
                                 sex                         32
                                 start len                   37 to 39
                                               fish no.      28 to 31
                                               record no.    27      }


{            list of include files
                   PrtConst
                   RvSETin
                   RvSETstr
                   Sort.box
                   SETInStr
                   Exist
                   HeadSet                          }


No parameter or other support files are required by the build
programs.
```

The data is read from the NEW (common) format and reduced to a version that was used by CatStat and MALKey1,2& 3. The data input and the reduced data fields are listed below for each of the four card types.

STATION AND SET CARD

```
  RVSET_INPUT_REC = record

*   CARD_TYPE     :    string [1];
    CRUISE        :    string [4];
    STATION       :    string [3];
    SET_NO        :    string [3];
    DATE          :    string [6];
    ICNAF_NAFO    :    string [3];
    EXPERIMENT    :    string [1];
    TIME_BEG      :    string [4];
    TIME_DUR      :    string [2];
    GEAR          :    string [3];
    AUX           :    string [1];
    SPEED         :    string [3];
    OBTAIN        :    string [1];
    LATITUDE      :    string [4];
    LONGITUDE     :    string [4];
    DEPTH_AVE     :    string [3];
    DEPTH_RAN     :    string [2];
    DISTANCE      :    string [2];
    SOURCE        :    string [1];
    WIND_DIR      :    string [1];
    WIND_FORCE    :    string [1];
    TIDE          :    string [1];
    TEMP_SUR      :    string [3];
    TEMP_BOT      :    string [3];
    SALIN_BOT     :    string [3];
    LIGHT         :    string [3];
+   BT_SLIDE      :    string [3];
+   HYDRO_STN     :    string [3];
    BOTTOM        :    string [1];
    NO_FISH       :    string [2];
    NO_INVERTS    :    string [2];
    WEIGHT_CAT    :    string [4];
    VER_DAT       :    string [4];
  end;
```

```
  RVSET_STORE_REC = record

    CRUISE        :    string [4];
    SET_NO        :    string [3];
    STATION       :    string [3];
    DATE          :    string [6];
    ICNAF_NAFO    :    string [3];
    EXPERIMENT    :    string [1];
    TIME_BEG      :    string [4];
    TIME_DUR      :    string [2];
    GEAR          :    string [3];
    AUX           :    string [1];
    SPEED         :    string [3];
    OBTAIN        :    string [1];
    LATITUDE      :    string [4];
    LONGITUDE     :    string [4];
    DEPTH_AVE     :    string [3];
    DEPTH_RAN     :    string [2];
    DISTANCE      :    string [2];
    SOURCE        :    string [1];
    WIND_DIR      :    string [1];
    WIND_FORCE    :    string [1];
    TIDE          :    string [1];
    TEMP_SUR      :    string [3];
    TEMP_BOT      :    string [3];
    SALIN_BOT     :    string [3];
    LIGHT         :    string [3];
    BT_SLIDE      :    string [3];
    HYDRO_STN     :    string [3];
    BOTTOM        :    string [1];
    NO_FISH       :    string [2];
    NO_INVERTS    :    string [2];
    WEIGHT_CAT    :    string [4];
    VER_DAT       :    string [4];
  end;
```

* removed fields
+ only present to be consistent with past data collection,
presently BT_Slide = set number
HYDRO_Stn = set number

Note: - See also Files Data : SET page 66

This indexed file increases the data storage by 31%. As the station and set data cards generally comprise less than 1% of the total RV data for a year this is not of any significance.

CATCH CARD

```
 RVCAT_INPUT_REC  = record                 RVCAT_STORE_REC  = record

*  CARD_TYPE    :     string[1];          SET_NO       :     string[3];
*  CRUISE       :     string[4];          SPECIES      :     string[4];
*  STATION      :     string[3];          DEPTH_GEAR   :     string[3];
   SET_NO       :     string[3];          TEMP_GEAR    :     string[3];
*  DATE         :     string[6];          SALIN_GEAR   :     string[3];
*  ICNAF_NAFO   :     string[3];          NUMBER_SP    :     string[5];
*  EXPERIMENT   :     string[1];          WEIGHT_SP    :     string[4];
*  TIME_BEG     :     string[4];          BASKET_SP    :     string[4];
*  TIME_DUR     :     string[2];          LENGTH       :     string[4];
   DEPTH_GEAR   :     string[3];          SEX          :     string[4];
   TEMP_GEAR    :     string[3];          MATURITY     :     string[3];
   SALIN_GEAR   :     string[3];          WEIGHT       :     string[3];
*  LIGHT        :     string[3];          OTOLITHS     :     string[3];
*  BOTTOM       :     string[1];          PARASITES    :     string[3];
   SPECIES      :     string[4];          STOMACH      :     string[3];
   NUMBER_SP    :     string[5];          FREE         :     string[3];
   WEIGHT_SP    :     string[4];          WEIGHT_CAL   :     string[1];
   BASKET_SP    :     string[4];        end;
   LENGTH       :     string[4];
   SEX          :     string[4];
   MATURITY     :     string[3];
   WEIGHT       :     string[3];
   OTOLITHS     :     string[3];
   PARASITES    :     string[3];
   STOMACH      :     string[3];
   FREE         :     string[3];
   WEIGHT_CAL   :     string[1];
 end;
```

* removed fields

Note: - See also Files Data : CATCH page 67

This reduces the data storage by 31%. The catch data cards generally comprise between 6 and 7% of the total RV data for a year.

LENGTH (Frequency) CARD

```
 RVLEN_INPUT_REC  = record
*  CARD_TYPE     :    string [1];
*  CRUISE        :    string [4];
*  STATION       :    string [3];
   SET_NO        :    string [3];
*  DATE          :    string [6];
*  ICNAF_NAFO    :    string [3];
*  EXPERIMENT    :    string [1];
   SPECIES       :    string [4];
   NO_SAMPLED    :    string [4];
   RATIO         :    string [2];
   SEX           :    string [1];
   LEN_INT       :    string [1];
   UNITS         :    string [1];
   RECORD_NO     :    string [1];
   GROUPING      :    string [1];
   START_LEN     :    string [3];
   LEN           :    array [1..14] of string [3];
 end;
```

```
RVLEN_STORE_REC  = record
   SET_NO        :    string [3];
   SPECIES       :    string [4];
   NO_SAMPLED    :    string [4];
   RATIO         :    string [2];
   SEX           :    string [1];
   LEN_INT       :    string [1];
   UNITS         :    string [1];
   RECORD_NO     :    string [1];
   GROUPING      :    string [1];
   START_LEN     :    string [3];
   LEN           :    array [1..14]
                         of string [3];
end;
```

* removed fields

Note: - See also Files Data : LENGTH page 68

This reduces the data storage by 22%. The length frequency data cards generally comprise between 13 and 15% of the total RV data for a year.

BIOLOGICAL (Fish) CARD

```
 RVBIO_INPUT_REC  = record

*  CARD_TYPE    :    string [1];
*  CRUISE       :    string [4];
*  STATION      :    string [3];
   SET_NO       :    string [3];
*  DATE         :    string [6];
*  ICNAF_NAFO   :    string [3];
*  EXPERIMENT   :    string [1];
*  BOTTOM       :    string [1];
   SPECIES      :    string [4];
   RECORD_NO    :    string [1];
   FISH_NO      :    string [4];
   LENGTH       :    string [3];
   SEX          :    string [1];
   MATURITY     :    string [1];
   WEIGHT       :    string [5];
   STOMACH_CON  :    string [1];
   ST_VOLUME    :    string [5];
   ST_NO_SPEC   :    string [2];
   ST_PART      :    string [2];
   ST_SP_CODE   :    string [4];
   AGE_MATERIAL :    string [1];
   AGE_ANNULI   :    string [2];
   AGE_EDGE     :    string [1];
   AGE_CHECK    :    string [3];
   AGE          :    string [2];
   YEAR_CLASS   :    string [2];
   AGER         :    string [1];
   PARASITE     :    string [3];
   FIELD_DEFN   :    string [6];
 end;
```

```
  RVBIO_STORE_REC  = record

 SET_NO       :    string [3];
 SPECIES      :    string [4];
 RECORD_NO    :    string [1];
 FISH_NO      :    string [4];
 LENGTH       :    string [3];
 SEX          :    string [1];
 MATURITY     :    string [1];
 WEIGHT       :    string [5];
 STOMACH_CON  :    string [1];
 ST_VOLUME    :    string [5];
 ST_NO_SPEC   :    string [2];
 ST_PART      :    string [2];
 ST_SP_CODE   :    string [4];
 AGE_MATERIAL :    string [1];
 AGE_ANNULI   :    string [2];
 AGE_EDGE     :    string [1];
 AGE_CHECK    :    string [3];
 AGE          :    string [2];
 YEAR_CLASS   :    string [2];
 AGER         :    string [1];
 PARASITE     :    string [3];
 FIELD_DEFN   :    string [6];
end;
```

* removed fields

Note: - See also Files Data : BIOLOGICAL page 69

This reduces the data storage by 25%. The biological (fish) data cards generally comprise between 76 and 80% of the total RV data for a year.

Each of these four data file records are a separate include file which can be incorporated as the format description in a Turbo Pascal program to access the research vessel data base. The file names are in the form 'RV'+xxx+'In.PAS', where xxx is either SET, CAT, LEN, or BIO respectively.

SpBld

- program to create a direct access data file for species codes used in Gulf groundfish surveys. This program is no longer in use and other programs now use standard ASCII files for species codes and names.

```
program Build_Species_Name_File;

  Date_Written:   85/07

  Function: This routine is used to build a working file of species
            names for use in identifying the species in the statistics
            programs both prior to processing and on the output.
            The program takes the base file SPECIES.DAT and strips off
            the ruler line and header documentation to create a file
            which can be used by the procedure GetParams

Include Files
{$I PrtConst.pas}
{$I SpName.pas}
{$I Exist.pas}
```

The raw species data file is SPECIES.DAT, the indexed output was SPECIES.DBA. The present SPECIES.DBA is the ASCII version of this and bears no relationship to the earlier name sake.

see also Utility File documentation: Species.DBA page 61
: CheckIT.SPP page 62

CatStat

- program to calculate the abundance by numbers and weight for a species in a single survey. The abundance of a species is estimated by set, by strata, and for the entire survey area.

```
program CATchSTATistics;
{ Program:         Estimate abundance from
                   Catch Statistics by Stratum

                       R esearch
                       V essel
                       AN alysis programs

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   Authority       Marine Fisheries Division
                   Gulf Fisheries Center, Moncton, N.B.
                   Department of Fisheries and Oceans

  Contract Author:          Pierre C. Brien
     (ver 1.0)              ISMT-Microcybernetics Ltd.
                            P.O. Box 3663
                            Halifax, N.S. B3J 3K6  (902)-425-6460

  Date_Written:    85/03    version:  1.0
                   85/08              2.0
                   86/02              2.1    modifications marked {2.1}
{                  86/04/04           2.2          "          "    {2.2}
{                  86/04/12           2.3          "          "    {2.3}
{                  87/04/13           2.4          "          "    {2.4}
{                  88/05/26           2.41         "          "    {2.41}
{                  89/03/23           3.0          "          "    {3.0}
{                  89/05/15           4.0          "          "    {4.0}

  {Function:     This routine estimates the catch statistics by stratum
                 of one species at a time for any number of species
                 and cruises in a run. For each species processed the
                 following steps occur:
                 1) the catch file data are selected for the desired
                    species and then sorted by stratum number producing
                    a temporary output file.
                 2) this output file is then used to generate a
                    statistical summary report.
                 This procedure is repeated for as many species as
                 required and for all cruises (files) as required.

                 The CatStat program has a feature incorporated to
                 allow for the transformation of data. Additional
                 transformations may be added to the program by
                 expanding the case statements in CatStat3.PAS.
                 This segment of the program transforms the data,
                 converts it back for printing and prints the
```

identification of the transformation in the header. The only transformation currently installed is log e of n+1 of numbers and weight.

Version 2.2 has added the capacity to incorporate missing strata with the mean biomass per unit area for the surveyed part of the Gulf. This is an add on feature in that the biomass estimates calculated in versions 2.1 and earlier are still given. Any instances where catch numbers exist with no catch weight recorded are now given a default catch weight of 1 rather than 0 as in earlier versions.

Version 2.3 allows the sets in a cruise to be non sequential in nature although they must still be sorted.

The parameter file provides for the following options:-

name of the listing file LST: for the listing device,
disk drive for the CAT,
SET,
SPECIES and
STRATA files,
selection of the valid EXPERIMENT types, and
transformation option codes for weight and number
(the codes presently implemented are:-
0 .... no transformation
1 .... log e of n+1)
report formating control: right margin,
left margin,
lines per page and
columns per line.

Version 2.4 uses the new data format as produced from AltCol, and includes a program and data version number on the output header.

Version 2.41 added S hort L ong version output option and a total standard deviation calculation.

Version 3.0 produces a file to use for CROSSTAB with strata, temperature, depth, species, species numbers and weight, total catch and total number of species.

Version 4.0 uses *.NEW data files (except for set card) in lieu of *.DBA.

****** end of documentation *******}

```
                    R esearch  V essel  AN alysis

   {             list of include files                            }

   {                    CatStat1
                        CatStat2
                        CrossTAB1
                        CrossTAB2
                        CrossTAB3
                        CatStat3
                        CatStat5
                        PrtConst
                        RvCATin
                        RvSETstr
                        SpName
                        Sort.box
                        GetDate
                        GetPar
                        Exist
                        HeadCat                          }

     PgmTitle  =
    'R esearch V essel AN alysis  CATSTAT      pgm ver:4.00 11 july 1989';

     PgmTitle2 =
    'Abundance Estimates / Numbers & Weight    dat ver:';
```

This program requires the associate files STRATA.DAT and SPECIES.DBA to function correctly. (see Utility Files)

To permit a degree of customization by the user, a parameter file is required to run the program. This file allows the user to select specific subsets of the data and (within limits) alter the format of the output. To protect the user against inadvertently using the wrong parameter file, the output lists most of the options used in the heading. The parameter file is named CatStat.PAR and is listed below.

```
CATSTAT.LST     ;printed output file        N for none
Y               ;printed output to printer Y/N
s               ;S hort or L ong version of output
d:              ;drive for RVXnnnC.NEW      Cat
d:              ;drive for RVXnnnS.DBA      Set
d:              ;drive for Species.DBA      Species data file
d:              ;drive for Strata.DAT       file containing stratum areas
c:              ;drive for XnnnSppp.CTB     CrossTAB file
>,<             ;delimiter for CrossTAB file
n               ;CrossTAB file produced     Yes/No
1 2             ;experiment type            valid types = 1,2,3
0 0             ;transformation options     Wght, Num 0=no tran 1=log e
2               ;right margin
4               ;left margin
66              ;lines per page
80              ;cols per line
```

Notes: The file name for the output canNOT have an 'n ' (that is an 'n' followed by a blank) in the name. The 'n' for none must start in column 1 and cannot be the word 'none'.

If your printer does not have a buffer, sending output to it will extend the running time considerably, a faster routine would be to send the output to a file and use the MS-DOS command PRINT to list it on your printer.

MALKey 1,2 & 3

- three programs to produce maturity or age by length keys of specified subsets of a research vessel survey. These programs use age or maturity from one or more cruises and the length frequency of a single cruise. These programs provide estimates of total and spawning stock biomass at age.

This is a series of three programs each of which produces a series of intermediate files that can be used for further analysis if required.

These programs all require access to STRATA.DAT and SPECIES.DBA in order to run, for further information on these files see Utility Files.

MALKey1

```
program AgeLengthKey1;

{ Program:        Multiple Cruise Age Length Key Table -- Part 1

                              R esearch
                              V essel
                              AN alysis programs

  Scientific      Douglas Clay                   (506)-857-6218
   Authority      Marine Fisheries Division
                  Gulf Fisheries Center, Moncton, N.B.
                  Department of Fisheries and Oceans

  Contract Author:        Pierre C. Brien
      (ver 1.0)           ISMT-Microcybernetics Ltd.
                          P.O. Box 3663
                          Halifax, N.S. B3J 3K6 (902)-425-6460

  Date_Written:   85/04     Version 1.0
                  85/08     Version 2.0  modifications marked {2.0}
{                 86/03     Version 2.1       "          "    {2.1}
{                 86/04     Version 2.2       "          "    {2.2}
{                 87/04     Version 2.3       "          "    {2.3}
{                 88/12     Version 2.31      "          "    {2.31}
{                 89/05     Version 3.31      "          "    {3.31}

 {Function: This is the first of three programs designed to generate
            X - Y matrices from either AGE and LENGTH, or MATURITY
            and LENGTH. This program will accumulate an age or
            maturity at length key matrix from one or more cruises.

            For floppy disk systems the opportunity exists to have
            the different cruises on different disks.
```

R esearch V essel AN alysis

The files used are 'RV'+ Xnnn +'B.NEW' and RV'+ Xnnn +'S.DBA', where Xnnn is a Cruise ID (the latter file is produced by the BldSET program). This program is a successor to the program ALKey.pas and will perform the same functions when used with only one cruise from which to build the matrix.

This Key may be run as an AGE Length Key or as a MATURITY Length Key but not as both simultaneously.

The age or maturity matrix as well as accompanying title date and author information are written to an intermediate file after processing. The file name is constucted as follows:

'M'+'A or M'+'LK'+Spec+'.DAT'

where Spec is the species ID code. In order to keep these files they must be renamed - possibly to a form such as Xnnn + Spec + .ALK where Xnnn is the cruise ID and Spec is the species ID code.

Several species may be processed in one run. Only one key per species can be saved at a time, due to the above file nomenclature.

Version 2.2 allows the use of non sequential set numbers, uses the GetDate function and defaults to the parameter file.

Version 2.3 uses the standardized format and adds the program and data version number to the output header.

Version 3.31 uses *.NEW files for biological card.

note:
A batch file option is now available using a FORTRAN program MALKGO to create an input file MALKEY.GO. To run this batch system simply type <MALKEY>.

```
          ******    end of Documentation  }


{         list of include files
{             MALKVar
              PrtConst
              SpName
              rvSETstr
              rvBIOstr
              MALK101
              BinSrch
              Exist
              MALK102
              MALK103
              Getpar
              GetDate
{             HeadAM1                }
```

To permit a degree of customization by the user, a parameter file is required to run each of the three programs. These files allow the user to select specific subsets of the data and (within limits) alter the format of the output. To protect the user against inadvertently using the wrong parameter file the output lists most of the options used in the heading. The parameter file for MALKey1 is named MALKey1.PAR and is listed below.

```
d:              ;drive for RVcccB.NEW      Bio
d:              ;drive for RVcccL.NEW      Len
d:              ;drive for RVcccS.DBA      Set
e:              ;drive for Species.DBA     Species codes
e:              ;drive for Strata.DAT      Strata numbers and areas
e:              ;drive for length/weight parameter file
c:              ;drive for Temporary Length Vectors (.6 k per set)
A               ;Select Age or Maturity    A/M
X               ;Include/eXclude missing ages or maturities   I/X
*               ;SexCodes to process       * = all or 1,2,3
1,2             ;Experiment Type           valid codes are 1,2,3
Y               ;L/W coefficients from 'MALKeyab.PAR'   Y/N
```

(parameter file for MALKey1)

NOTES:- all missing lengths are excluded automatically

the coefficients from the length/weight regression can be entered from the parameter file or entered by user interactively

the drive for temporary length vectors is the location of the stored age/maturity matrix

An additional file used by this program is the list of regression coefficients (a & b) to be used in the run(s). It is stored as MALKeyab.PAR, an example follows:

```
0010                     species code
0.007656                 a:    length weight regression parameters
3.044187                 b:
0012
0.004804
3.1017
0040
0.00478527
3.17746
```

The 'a' and 'b' used in this file should give the weight of a fish in grams.

MALKey2

```
program AgeLengthKey2;

{ Program:          Multiple Cruise Age Length Key Table -- Part 2

                         R esearch
                         V essel
                         AN alysis programs

  Scientific        Douglas Clay                        (506)-857-6218
   Authority        Marine Fisheries Division
                    Gulf Fisheries Center, Moncton, N.B.
                    Department of Fisheries and Oceans


  Contract Author:          Pierre C. Brien
   (ver 1.0)                ISMT-Microcybernetics Ltd.
                            P.O. Box 3663
                            Halifax, N.S. B3J 3K6   (902)-425-6460


  Date_Written:     85/04       Version 1.0
                    85/08       Version 2.0  modifications marked {2.0}
{                   86/03       Version 2.1      "           "    {2.1}
{                   86/04       Version 2.2      "           "    {2.2}
{                   87/04       Version 2.3+.01  "           "    {2.3}
{                   88/04       version 2.4      "           "    {2.4}
{                   88/12       version 2.5      "           "    {2.5}
{                   89/04       version 2.55     "           "    {2.55}
{                   89/05       version 3.55     "           "    {3.55}
{                   89/06       version 3.6      "           "    {3.6}

{Function: This is the second of three programs designed to generate
           X-Y matrices from either AGE and LENGTH or MATURITY and
           LENGTH. This program uses the accumulated age or maturity
           at length matrix from one or more cruises that were stored
           by MALKey1.

           This program accumulates a length by stratum set of vectors
           for use in expanding the numbers and percent composition
           to survey and population estimates.

           The stored key and the length vectors are combined with
           appropriate area weighting and then printed to an output
           file and/or printer according to the options selected in
           the parameter file.
```

For floppy disk systems the opportunity exists to have the different cruises on different disks. The files used are RV Xnnn L.NEW and RV Xnnn S.DBA where Xnnn is a Cruise ID (the set file output is from the BldSET program).

This Key may be run as an AGE Length Key or as a MATURITY Length Key but not as both simultaneously.

This program uses the age or maturity matrix stored by MALKey1. This intermediate file can be based on one or more cruises.

The length by strata data are stored as a matrix with accompanying title, date and author information obtained from the user. The file name is constructed as follows:

Xnnn + Spec + '.LEN'

where Xnnn is the cruise ID and Spec is the species code ID. Several species may be processed in one run. Only one key per species cruise combination can be saved at a time, this is due to the above file nomenclature.

Version 2.2 allows the use of non sequential set numbering, date retrieval from the GetDate function, and parameter file default.

Version 2.3 uses the standardized data format and adds the program and data version number to the output header.

Version 2.4 corrects an error in the sampled/caught ratio on the length frequency. Ver 2.41 corrects a misassignment of 1 for the length frequencies due to the change in data recording on the length frequency cards. Ver 2.42 corrects the test for when to stop reading records for a species. This program now tests species as well as set number.

Version 2.5 incorporates the average length and weight by age as the average value of the table in which it appears rather than the average of the measured fish. The weights of fish from the cruise (survey) total and Gulf (area) total are calculated from the regression coefficients (a & b) and used in those tables with numbers estimated for expanded areas.

Tables 1 and 2 now contain the average length, weight and age of the measured (detailed) fish. Tables 3 and 4 contain the mean length and weight of those fish in the table based on the length weight regression.

Version 2.55 incorporates corrections for an error in the calculation of sex separated keys. BldLen ver 2.3 was also updated to BldLen 2.31 to include sex as a sorting criteria.

Version 3.55 uses *.NEW files (except for set card) in lieu of *.DBA files.

Version 3.6 adds the option of defining a maturity type for a particular run. The first type, 'ML' (Maturity at Length), produces a report and output file with the total number of fish at length for each maturity stage, the output file is named XnnnSppp.MAL. This file contains the percent of mature fish associated with each length in the data file. The second option maturity type, MA (Maturity at Age), when run at a subsequent time then reads this file and produces a report of the mature fish (capable of spawning) at age. The 'ML' (Maturity at Length) option is run with 'M' AgeOrMaturity option. The 'MA' maturity type option is run with the 'A' AgeOrMaturity option. In order to obtain a run without these maturity options an 'N ' can be entered for none, in this case the total survey numbers at age or at maturity will be output.

This version (3.6) can also create a total of seven new files. Some are activated with (Y/N) in the parameter file and others are created depending on the type of run. Files containing the average length at age and average weight at age are created with directives from the parameter file. The file names are XnnnSppp.AL? and XnnnSppp.AW?. Where the ? represents 'S' or 'T' for spawning or total.

Length frequency files from tables 1, 3 and 4 are also created with directives from the parameter file. The file names are XnnnSppp.L1?, XnnnSppp.L2? and XnnnSppp.L4? where the ? represents 'S' or 'T' for spawning or total.

Finally, population at age and maturity at age files are created depending on the type of run executed. An age at length run with a maturity type 'N ' - for none, will produce a population at age file from table 4 (Gulf estimates). An age at length run with maturity type 'MA' creates a maturity at age file, containing the number of spawning fish, also taken from table 4. The file names are XnnnSppp.PNA and XnnnSppp.MNA respectively. (These extensions stand for Population Numbers at Age and Mature Numbers at Age.)

note:

A maturity type 'MA' cannot be specified in a maturity run (AgeOrMaturity option = M).
An option of maturity type 'MA' may not be run without a previous run of maturity type 'ML'.

note:

A batch file option is now available using a FORTRAN program MALKGO to create an input file MALKEY.GO. To run this batch system, simply type <MALKEY>.

****** end of Documentation)

```
{           list of include files
{              MALKVar                                            {2.0}
               PrtConst
               SpName
               rvSETstr
               rvLENin
               NewVal                                              3.55
              {Exist                                              {2.5}
               HeadAM2
              {GetDate                                            {2.2}
              {MALK201                                            {2.2}
               MALK202
               GetTitle
               Getpar                            }
const
     PgmTitle2 =
 'Age/Maturity  Length Key Statistics                Dat ver:';
     PgmTitle  =
 'R esearch V essel AN alysis    MALKEY2             Pgm ver:3.6   08 jun 89';
```

The parameter file for MALKey2 follows.

```
A2p079c.TOT        ;printed output file detailed key      N for none/file name
n                  ;printed output to printer Y/N
c:                 ;drive for RVcccB.NEW      Bio
c:                 ;drive for RVcccL.NEW      Len
c:                 ;drive for RVcccS.DBA      Set
d:                 ;drive for Species.DBA     Species codes
d:                 ;drive for Strata.DAT      Strata numbers and areas
d:                 ;drive for Temporary Length Vectors (.6 k per set)
A                  ;Select Age or Maturity    A/M
N                 ;Maturity Type             MA/ML/(N)one
YY                 ;Avg Length/Weight at age files Y/N   eg:YY/NN/YN/NY
YYY                :Length Freq. files from table 1/3/4  eg:NNN,YYY,NYY,YNY etc.
>,<                ;delimiter for printed files Y/N
X                  ;Include/eXclude missing ages or maturities   I/X
1                  ;Experiment Type           valid codes are 1,2,3
1,3,4              ;Print options 1=actual 2=%table 3=*Lengths 4=*Gulf N=none
1                  ;Right Margin
6                  ;Left Margin
56                 ;LinesPerPage
80                 ;ColsPerLine

                   {parameter file for MALKey2}
```

NOTES

- Print options are entered   eg: 1/ 1,4 /1,2,3,4 or N for none
- The file name for the output canNOT have an 'n ' (that is an 'n' followed by a blank) in the name. The 'n' for none must start in column 1 and can not be the word 'none'.
- The drive for temporary length vectors is the location of the stored age/maturity matrix and the length by strata data.
- If your printer does not have a buffer, sending output to it will extend the running time considerably. A faster routine would be to send the output to a file and use the MS-DOS command PRINT to list it on your printer.

MALKey3

```
program AgeLengthKey3;

{ Program:          Multiple Cruise Age Length Key Table -- Part 3

                          R esearch
                          V essel
                          AN alysis programs

  Programmer:       Douglas Clay                 (506)-857-6218
                    Marine Fisheries Division
                    Gulf Fisheries Center, Moncton, N.B.
                    Department of Fisheries and Oceans


  Date_Written:     {taken from MALKey2 version 2.42}
                    88/04         Version 3.0    modification marked{3.0}
                    89/04         Version 3.01

{Function: This is the third of three programs designed to generate
           X - Y matrices from either AGE and LENGTH or MATURITY and
           LENGTH. This program uses the accumulated age at length
           matrix from one or more cruises that were stored by MALKey1.

           The age or maturity matrix and the length by strata are
           used from previously stored files. This program stores
           the catch at age by set and variance data in a file.
           The file name is constucted as follows:

                      Xnnn + Spec + '.CAT'

           where Xnnn is the cruise ID and Spec is the species code ID.

           This program also uses the accumulated Length by Stratum set
           of vectors stored by MALKey2 for use in calculating the catch
           at age by set and variance both by strata and for the
           entire survey.

           The stored key and the length vectors are combined with
           appropriate area weighting and then printed to an output
           file and/or printer according to the options selected
           in the parameter file.

           This Key may be run as an AGE Length Key or as a MATURITY
           Length Key but not as both simultaneously.

           Several species may be processed in one run. Only one key
           per species cruise combination can be saved at a time,
           due to the above file nomenclature.
```

```
               Version 3.0 incorporates variance calculations for catch at
               age according to the report by Smith and Somerton (1981),
               Strap: A user orientated computer analysis system for
               groundfish research trawl survey data. Can. Tech. Rept.
               Fish. Aquat. Sci:1030.

               Age by age variance is calculated for each strata and
               weighted by area for the entire cruise. This program also
               produces a set by set catch at age table.

               Version 3.01 replaces the variance calculated with the
               equivalent CV in % (ie. times 100).

                    ******    end of Documentation  }


{              list of include files

{                   MALKVar
                    PrtConst
                    SpName
                    Exist
                    HeadAM3
                   {GetDate
                   {MALK301
                    MALK303
                    GetTitle
                    GetPar
                                                           }
const
   PgmTitle2 =
    'Age/Maturity  Length Key Statistics       dat ver:';
   PgmTitle  =
    'R esearch V essel AN alysis    MALKey     pgm ver:3.01  19/04/89';
```

The parameter file for MALKey3 is as follows:

```
K3.OUT          ;printed output file summary/variance  N for none
y               ;printed output to printer Y/N
d:              ;drive for RVcccB.NEW      Bio
d:              ;drive for RVcccL.NEW      Len
d:              ;drive for RVcccS.DBA      Set
d:              ;drive for Species.DBA     Species codes
d:              ;drive for Strata.DAT      Strata numbers and areas
c:              ;drive for Temporary Length Vectors (.6 k per set)
A               ;Select Age or Maturity    A/M
X               ;Include/eXclude missing ages or maturities   I/X
*               ;SexCodes to process       * = all or 1,2,3
1               ;Experiment Type           valid codes are 1,2,3
1               ;Print options 1=actual 2=%table 3=*Lengths 4=*Gulf
1               ;Right Margin
6               ;Left Margin
60              ;LinesPerPage
80              ;ColsPerLine
```

(parameter file for MALKey3)

NOTES

Print options are entered   eg: 1/ 1,4 /1,2,3,4
or N for none

The file name for the output canNOT have an 'n ' (that is an 'n' followed by a blank) in the name. The 'n' for none must start in column 1 and can not be the word 'none'.

The drive for temporary length vectors is the location of the stored age/maturity matrix, the length by strata data, and also the catch at age by set data.

If your printer does not have a buffer, sending output to it will extend the running time considerably. A faster routine would be to send the output to a file and use the MS-DOS command PRINT to list it on your printer.

PikAMap

- program to select a smaller subset of points from a large map data base in order to reduce plotting time. This program is also designed to aid in editing a digitized map.

```
program PIcK_A_MAP;

{    program       PIcK A MAP
                   to select a subset of scaled points from a master
                   data set of a map drawn from coordinates expressed
                   as digitized longitudes and latitudes

                   OR

                   to edit a set of scaled points to reduce the overall
                   size of the data file or to remove erroneous points.

                         R esearch
                         V essel
                         AN alysis programs


                   Douglas Clay          (506)-857-6218
                   Marine and Anadromous Fisheries Division
                   Gulf Fisheries Center, Moncton, N.B.
                   Department of Fisheries and Oceans

    Date_Written:  87/06/18                    version 1.0
                   89/01/15                    ver     2.0

                        Documentation

                   The available map coordinates are from the US MarMap
                   program from Woods Hole and cover the Atlantic coast
                   from the Carolinas to northern Labrador. This program
                   allows pre-selection of subsets from this larger
                   map data base for maps in frequent use. Preselecting
                   a smaller map set results in much faster plotting,
                   although for a single 'one shot' map a 'window' in
                   the larger data set can be used.

                   Longitudes are by convention stored as negative values.
                   The degrees and minutes are stored as decimal degrees.

                   Version 2.0 allows file editing of the list of scaled
                   points by either taking a set percentage or by
                   targeting for a specific accuracy. A segment by
                   segment map is produced to aid in editing.

                   The printer must be turned on in Edit mode, it is not
                   required in Select mode.
               **** end of Documentation   }
```

```
{                       list of include files
                             PrtConst
                             Exist
                             HeadPiK
                             NewVal
                             GetDate
                             PikAMap1
                             PikAMap2
                             PikaMap3                                  }


const
   PgmTitle =
'R esearch V essel AN alysis     PikAMap       pgm ver: 2.0   15/JAN/89';
```

This program requires two parameter files. The first, AtlMap.PAR is the same as that used by the program AtlMap (see page 58). It provides the coordinates for the smaller map being selected from the larger master map. The second parameter file, **PikAMap.PAR** is specific to this program and is listed below. It is used when editing a new map.

```
Y                             Print A Segment listing      Y/N
Y                             Print A Map  of the segment  Y/N
200                           Segment size
75                            Map width - columns    segment map dimensions
45                            Map height - rows          "     "      "
LC4462_1.MAP                  Starting original map
Edit.MAP                      Finished map
Pikamap.OUT                   Audit output file
```

The map width and height are currently set for 8.5 x 11 inch paper

The nameing protocols for digitized maps are:
    the map number   ie. LC4462
    the portion of the map in that section   ie. 1,2,3,4,etc.
    extention   ie. .MAP

LC4462_3.MAP is the file for the third sector of map LC4462

CatMap

- program to select catch statistics by number or weight from the research vessel data set for a particular cruise - species combination. The data is presented for plotting by AtlMap.

```
program CATchstatisticsMAPping;

{ Program:          CatMap

                    retrieves the estimates of abundance from the
                    research vessel data base (catch cards) using
                    a modification of the RVAN program:
                    CATch STATistics by stratum.

                        R esearch
                        V essel
                        AN alysis programs

                    Douglas Clay            (506)-857-6218
                    Marine Fisheries Division
                    Gulf Fisheries Center, Moncton, N.B.
                    Department of Fisheries and Oceans


  Date_Written:     87/06/19                1.0
                    taken as modification from CatStat ver 2.4}
                   {89/05/24     version    2.0     modifications  2.0}


  {Function:      This routine is used to retrieve the catch statistics
                  by numbers or weight for any species and cruise for
                  subsequent plotting with the program AtlMap.

                  For each species processed the following steps occur.
                  1) the catch file data are selected for the desired
                     species and then sorted by size of catch producing
                     a temporary output file.
                  2) this output file is then used to generate a map on
                     the screen or plotter .

                  This procedure can be repeated for as many species as
                  required and for all cruises (files) as required.

                  Version 2.3 of CatStat allowed the sets in a cruise to
                  be non sequential in nature although they must still be
                  sorted.
```

```
                 R esearch  V essel  AN alysis

                The parameter file provides for the following options:
                 -name of the listing file, LST: for the listing device
                 -transformation option codes for weight and number
                      the codes presently implemented are:-
                            0  .......  no transformation
                            1  .......  log e of n+1
                 -report formatting control,
                 -right margin, left margin,
                 -lines per page and columns per line.
                 -selection of catch numbers or weight

                Version 1.0 uses the new data format as produced from
                AltCol and includes a data version number on the output
                header.

                Version 2.0 uses *.NEW files for the catch data.


                ******  end of documentation *******}


{             list of include files                                 }{2.1}

{                  CatMap1
                   CatMap2
                   CatMap3
                   CatMap4
                   CatMap5
                   PrtConst
                   RvCATin
                   RvSETstr
                   SpName
                   Sort.box
                   GetDate
                   GetPar
                   Exist
                   HeadMap                       }


  PgmTitle1 =
 'R esearch V essel AN alysis  CatMap       pgm ver:2.0  24 may 1989';

  PgmTitle2 =
 'Abundance Estimates / Numbers & Weight    dat ver:';
```

This program requires the associate files STRATA.DAT and SPECIES.DBA to function correctly. (see Utility Files)

To permit a degree of customization by the user, a parameter file is required to run the program. This file allows the user to select specific subsets of the data. To protect the user against inadvertently using the wrong parameter file, the title on the map lists some of the options used. The parameter file is named **CatMap.PAR** and is listed below.

```
CatMap.LST      ;printed output file        N for none
N               ;printed output to printer  Y/N
D:              ;drive for RVXnnn.DBA       Cat
D:              ;drive for RVcccS.DBA       Set
D:              ;drive for Species.DBA      Species data file
D:              ;drive for Strata.DAT       file containing stratum areas
1 2 8           ;experiment type            valid types = 1,2,3
0 0             ;transformation options     Wght, Numb 0=no tran 1=log e
2               ;right margin
4               ;left margin
66              ;lines per page
80              ;cols per line
W               ;plotting variable          W/N  weight & numbers per tow
```

notes: The file name for the output canNOT have an 'n ' (that is an 'n' followed by a blank) in the name. The 'n' for none must start in column 1 and cannot be the word 'none'.

AtlMap

- program to plot a map with stations marked either for location only (by an 'x') or for a scaled catch or other variable (circle). The data is required in the form longitude, latitude, catch.

```
program ATLanticMAPping;

{   program       -to plot scaled points on a map which is drawn from
                  coordinates expressed as longitudes and latitudes
                  previously stored on data files.

                         R esearch
                         V essel
                         AN alysis programs

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                  Gulf Fisheries Center, Moncton, N.B.
                  Department of Fisheries and Oceans

  Date_Written:   87/06/18          version 1.0  turbo screen version
                  87/08/15                  2.0  Hp 7470 version
                  89/01/20                  2.1

                        Documentation

                  The available map coordinates are from the US MarMap
                  digitized coastline and depth contours from Woods Hole
                  Oceanographic Institute and cover the Atlantic coast
                  from the Carolinas to northern Labrador. A program
                  'PIKAMAP' allows pre-selection of subsets from this
                  larger map data base (or any data set) for maps in
                  frequent use.

                  Preselecting a smaller map set results in much faster
                  plotting, although for a single 'one shot' map a
                  'window' in the larger data set can be used.

                  Longitudes east of Greenwich are by convention stored
                  as negative values, similarly latitudes south of the
                  the equator are negative.

                  One option in the parameter file allows plotting of set
                  locations only when the distribution of sampling is
                  required. A second option allows only coastlines
                  and place names if required.

                  There are two options, the screen option (a preview)
                  and an HP plotter option (sending commands in HPGL).
                  THe screen version does not support all the refinements
                  available for the plotter.
```

Locations (any text) can be placed anywhere on the map in any size, at any angle. The names (text) are entered on a file named in the parameter file, by convention this file has .LOC as the extention.

```
list of include files
   TypeDef.sys    |
*  Graphix.sys     } Turbo graphix tool kit
   Kernel.sys     |
     SpName
     Exist
     HeadAtl
     GetPar
     NewVal
     AtlMap1
     AtlMap2            }
```

* this file must be installed correctly for the graphics card in the computer in use, currently installed as CGA card.

This program requires the associate files from the Turbo Graphix Toolkit for the fonts being used in the title and the utility file SPECIES.DBA to function correctly. (see Utility Files)

To permit a degree of customization by the user, a parameter file is required to run the program. This file allows the user to select specific subsets of the data. To protect the user against inadvertently using the wrong parameter file, the title on the map lists some of the options used. The parameter file is named AtlMap.PAR and is listed below.

This parameter file is also used by the program PikAMap.

```
GulfS.Map           map for default plotting
-66.25              maximum longitude (negative by convention for deg E)
46.5                minimum latitude
-64.00              minimum longitude (negative by convention for deg E)
48.5                maximum latitude
1.00                interval for CrossHairs
0                   line type for primary file (coast line)
4                   legend corner [TopLeft-1,TRight-2,BottomR-3,BL-4]
c:                  drive for Species.DBA     Species data file
n                   HpPlot7470: Y for HP7470 plot & N for screen graph
1                   CircleScale
0500                short delay - crosses
1000                medium delay-
2500                long delay  - circles
Y                   Location_Only: Y/N=sampling sites & C=scaled catches
>               Maritime Provinces                <Title for map only
GulfS.Loc           file for location place names
```

In order to use various plotters a batch file can be created to install the COM1 port of the computer to correspond to the plotter. PLOTTER.BAT has been set up to allow the computer to match an HP plotter set to 9600 baud. PLOTTER.BAT follows:

```
mode COM1:9600,e,7,1
COM1:9600,e,7,1 -
```

ADDENDUM

Since the preparation of this report nearly a year has passed. This program now has the capacity to have overlays (ie. depth contours, political boundaries, etc.) in various pen thicknesses and line types, layers of data points in different colours and symbols that can be variable in size and shape. The value assigned to each size of data symbol in the ledgend is now selected in the parameter file.

The current version is 3.16. The sample plot on page 132 was produced by version 3.16.

Utility Files - Species File **SPECIES.DAT**

```
L-----!-----!-!-!---------!---!---------------------------R
------------------------------^---------------------------
```

[This file and its product are no longer in use.]

This is the species list for all marine fish species surveyed during southern Gulf research cruises.

The following comment lines can be kept at the top of the file, they will be ignored by the program which will search for the character string '****' in the first 4 characters of each line and will then use the data lines which follow.

The first line of this file is a WORDSTAR ruler line which may be used when modifying or adding to the file. The fields on the first line are: species code (4 digit code),
weight divisor (weights are recorded in grams, to give kilograms divide by 1000),
number of decimals to print,
(each of these integers must be separated by a blank on the working file)
a units title (10 character) for output, and
the 'a' and 'b' values from the length-weight regression.
The age-length regression follows in F10.8 format.

On the second line the fields are:
the common name (30 character) and
scientific name (30 character).

The ^ on the line under the ruler line indicates the location of the start of the scientific name.

Dividing the weight by 1000 will give kilos, the final output field is 4 characters thus with 2 decimal places the weight could range from 0.00 - 9.99 kg.

This file is indexed and rebuilt by the program SpBld (Species BuiLD) and then used by the RVAN package as SPECIES.DBA.

```
****
 .... sample file
0010  1000  1 3 Kilos.          0.0084    3.01500
Cod                             Gadus morhua
0011  10    2 1 Kilos.
Haddock                         Melanogrammus aeglefinus
0012  1000  1 1 Kilos.          0.0048    3.102
White Hake                      Urophycis tenuis (Mitchill)
0014  10    2 1 Kilos.
Silver Hake                     Merluccius bilinearis (Mitchill)
0112  10    2 1 Kilos.
Long-Fin Hake                   Urophycis chesteri
0013  10    2 1 Kilos.
Red Hake                        Urophycis chuss (Walbaum)
0016  10    2 1 Kilos.
Pollock                         Pollachius virens (Linnaeus)
 ......
```

Utility Files - Species File **SPECIES.DBA**

This is a sample of the actual ASCII file used by all the programs in this series. All species caught from 1983 to present are listed in this file. Species are added as new occurences are found by the edit program CheckIT.

```
0010 1000  1  x 1 Kg
Atlantic Cod                       Gadus morhua
0011 1000  2  x 1 Kg
Haddock
0012 1000  1  x 1 Kg
White Hake                         Urophycis tenuis (Mitchill)
0013 1000  2  x 1 Kg
Red Hake
0014 1000  2  x 1 Kg
Silver Hake
0015 1000  1  x 1 Kg
Cusk
0016 1000  1  x 1 Kg
Pollock
0020 1000  2  x 1 K[illegible]
Winter Skate
0023 0100  1  x 10[illegible]
Redfish - unspecified              Sebastes spp.
0030 1000  1  x 1 Kg
Atlantic Halibut
0031 1000  2  x 1 Kg
Greenland Halibut
0040 1000  2  x 1 Kg
American Plaice                    Hippoglossoides platessoides
0041 1000  2  x 1 Kg
Witch Flounder
0042 0100  1  x 100 g
Yellowtail Flounder
0043 0100  1  x 100 g
Winter Flounder
0050 1000  1  x 1 Kg
Atlantic Wolffish
 .
 ...  sample file only
 .
4511   10  2  x 10 g
Squid
6200   10  2  x 10 g
Brittle Star
8100   10  2  x 10 g
Comb Jellies
8324   10  2  x 10 g
Soft Coral
```

Utility Files - Species File **CheckIT.SPP**

This file contains the same species (and codes) as SPECIES.DBA. It has some differences: 1) the common name is a shortened form using the 3 character NAFO code wherever possible, 2) regression coefficients (a & b) are added for males, females, and combined sex for the length and weight (first line) and length and age (second line). The numerals for the regression coefficient must be right justified in their 9 digit field. The coefficients should give the weight in grams and the age in years from the length in cm.

```
0010     A   0.0084B    3.015A   0.0084B    3.015A   0.0084B    3.015L/W
0010     A         B         A         B         A         B         L/A
COD-A
0011
0011
HAD
0012     A   0.0048B    3.102A   0.0048B    3.102A   0.0048B    3.102
0012     A  21.1320B   0.5956A   19.288B   0.6997A   20.034B  0.65500
HKW
 .
 .
 .
0031
0031
GHL
0040     A0.0047853B  3.17746A0.0047853B  3.17746A0.0047853B  3.17746
0040     A         B         A         B         A         B
PLA
0041     A0.0000893B  4.14487A0.0000893B  4.14487A0.0000893B  4.14487
0041     A         B         A         B         A         B
WIT
0042
0042
YEL
 .
 . sample file for documentation purposes
 .
0201
0201
T-SKA
0202
0202
S-SKA
 .
 .
 .
8600
8600
SPONGE-UN
9200
9200
STONES/ROCKS
```

Utility Files - Stratum File **STRATA.DAT**

The stratum number is listed and the corresponding stratum area is given in square nautical miles. In some years the research vessel data files have the strata coded as '015' or ' 15' rather than '415'. To standardize the RVAN package to a single format, AltCol and the Build programs make all of the data files the same and use '4' as the first digit to represent NAFO area 4.

```
401  0344           {441}{North coast P.E.I.}
402  0452           {440}{Northumberland Strait}
403  0113           {430}{St. Georges Bay}
415  0764            404  0048                {Cheticamp}
416  1067            405  0060                {Baie des Chaleurs}
417  0525            406  0171                {Tracadie}
418  0394            407  0128                {Gaspe}
419  0443
420  0773
421  0329
422  1244
423  3211
424  1050
425  0630
426  0388
427  0951
428  0202
429  1696
430     0                not assigned
431  1419
432  0301
433  1188
434  1211
435  0639
436  0958
437  0495
438  0168
439  0353
```

The STRAT.DAT files are not indexed and are left in their original ASCII format, sorted by stratum number.

Stratum 430 does not exist and strata 404 to 407 have been identified and mapped for area but have not been used in any survey as of January 1989.

Strata numbers 401 to 414 are also assigned and used by other regions of DFO. They are used in the northern part of division 4T including parts of the St. Lawrence River.

Utility Files - Stratum File **CRUZYR.PAR**

CruzYR.PAR is used by many programs to verify a valid cruise selection and provide a year of survey for the header output. This file is kept up to date by running the edit program CheckIT.

```
P079 70
P091 71
P106 72
P122 73
P143 74
P157 75
P172 76
P188 77
P204 78
P229 79
P244 80
P260 81
P278 82
P296 83
P312 84
A001 85
A002 85
A003 85
A004 85
A005 85
N012 85
P327 85
P328 85
H141 85
H142 85
H143 85
A010 86
H159 86
H160 86
H161 86
H166 86
N014 86
N017 87
N073 87
H172 87
H174 87
H179 87
H884 88
N028 88
END  99
```

Data Files

- **the research vessel surveys in the Gulf Region are recorded on five data or card types. Four of these are keypunched, they are the station and set card, the catch card, the length (frequency) card and the biological (fish) card.**

Data formats were originally laid down in the late 1960's and were used from 1970 to 1983 for the fall (September) groundfish survey in the southern Gulf of St. Lawrence. The four data formats were limited to the 80 column computer card style of this earlier period. To permit use of the greater flexibility provided by new computers the formats were altered slightly during 1984 and 1985. No data were lost and the new or altered fields were combined with the historical data to provide a single compatible format for the entire data series.

The following listings of the formats of these data cards indicate both the past and current data collection and also indicate the columns for the present standardized data storage. The file nomenclature for the research data files is 'RV' + Xnnn + T '.DAT' for the keypunched version, where Xnnn represents the cruise ID, T represents a single letter S/C/L/B for set, catch, length, or biological card type. Data files with the extension .DAT are the keypunched version and those with the extension .NEW are the new standardized format version created after running the program AltCol. Files with reduced headers are produced from these files by the programs BldXXX, these have the extension .DBA.

Files with the extension .DAT are similar in format for the periods 1970 to 1983, 1984, 1985, and 1986 to 1987. (The format has not changed in 1988, however, some codes have been altered and care must be used when using data spanning the 1987/88 period.) Files with the extension .NEW and .DBA are standard format over all years.

Data preparation sequence and the programs and species files used with each format are presented below:-

file type	description	programs	species file
.DAT	keypunched version	AltCol	Species.DBA
.NEW	prepared by AltCol	CheckIT	CheckIT.SPP
		BioFreq	Species.DBA
		DataLst	Species.DBA CheckIT.SPP
		BldXXX	..none.....
		CatStat	Species.DBA
		MALKey1	Species.DBA
		MALKey2	Species.DBA
		MALKey3	Species.DBA
		CatMap	Species.DBA
.DBA	prepared by BldXXX	reduced files available for use	

STATION SET CARD FORMAT

- found on the include file **RvSETac.pas** in AltCol.

```
 RVSET_INPUT_REC = record          {column numbers on NEW file}

   CARD_TYPE     :    string [1]; { 1}
   CRUISE        :    string [4]; { 2}
   STATION       :    string [3]; { 6}
   SET_NO        :    string [3]; { 9} {2 before 1984 - 3 after 1983}
   DATE          :    string [6]; {12}
   ICNAF_NAFO    :    string [3]; {18}
   EXPERIMENT    :    string [1]; {21}
   TIME_BEG      :    string [4]; {22} {3 before 1985 - 4 after 1984}
   TIME_DUR      :    string [2]; {26} {2 before 1986 - 4 after 1985 $}
   GEAR          :    string [3]; {28} {2 before 1986 - 3 after 1985}
   AUX           :    string [1]; {31}
   SPEED         :    string [3]; {32}
   OBTAIN        :    string [1]; {35}
   LATITUDE      :    string [4]; {36}
   LONGITUDE     :    string [4]; {40}
   DEPTH_AVE     :    string [3]; {44} {DEPTH_AVE before 1986 $ }
   DEPTH_RAN     :    string [2]; {47} {2 before 1986 - 3 after 1985 $}
   DISTANCE      :    string [2]; {49}
   SOURCE        :    string [1]; {51}
   WIND_DIR      :    string [1]; {52}
   WIND_FORCE    :    string [1]; {53}
   TIDE          :    string [1]; {54}
   TEMP_SUR      :    string [3]; {55}
   TEMP_BOT      :    string [3]; {58}
   SALIN_BOT     :    string [3]; {61}
   LIGHT         :    string [3]; {64}
   BT_SLIDE      :    string [3]; {67} {zero or blank since 1984  + }
   HYDRO_STN     :    string [3]; {70} {zero or blank since 1984  + }
   BOTTOM        :    string [1]; {73}
   NO_FISH       :    string [2]; {74}
   NO_INVERTS    :    string [2]; {76}
   WEIGHT_CAT    :    string [4]; {78}
   VER_DAT       :    string [4]; {82} {exists after 1985 only}
end;                              {85 - last character}
```

$ - both TIME_DUR, DEPTH_AVE and DEPTH_RAN must be calculated from TIME_BEG and TIME_END and DEPTH_BEG and DEPTH_END respectively.

+ - since 1984 these numbers have been made equal to the SET_NO and thus are no longer entered.

CATCH CARD FORMAT

- found on the include file **RvCATac.pas** in AltCol.

```
RVCAT_INPUT_REC  = record        {column numbers on NEW file}

   CARD_TYPE    :    string [1]; { 1}
   CRUISE       :    string [4]; { 2}
   STATION      :    string [3]; { 6}
   SET_NO       :    string [3]; { 9} {2 before 1984 - 3 after 1983}
   DATE         :    string [6]; {12}
   ICNAF_NAFO   :    string [3]; {18}
   EXPERIMENT   :    string [1]; {21}
   TIME_BEG     :    string [4]; {22} {3 before 1986 - 4 after 1985}
   TIME_DUR     :    string [2]; {26} {2 before 1986 - 4 after 1985 $}
   DEPTH_GEAR   :    string [3]; {28} {ave before 1986 - st after 1985}
   TEMP_GEAR    :    string [3]; {31}
   SALIN_GEAR   :    string [3]; {34} {dropped after 1985}
   LIGHT        :    string [3]; {37} {dropped after 1985}
   BOTTOM       :    string [1]; {40}
   SPECIES      :    string [4]; {41}
   NUMBER_SP    :    string [5]; {45}
   WEIGHT_SP    :    string [4]; {50}
   BASKET_SP    :    string [4]; {54}
   NO_LENGTH    :    string [4]; {58}
   SEX          :    string [4]; {62}
   MATURITY     :    string [3]; {66}
   WEIGHT       :    string [3]; {69}
   OTOLITHS     :    string [3]; {72}
   PARASITES    :    string [3]; {75}
   STOMACH      :    string [3]; {78}
   FREE         :    string [3]; {81} {1 before 1986 - 3 after 1986}
   WEIGHT_CAL   :    string [1]; {84}
end;                             {84 - last character}
```

$ - TIME_DUR must be calculated from TIME_BEG and TIME_END and DEPTH_GEAR is the starting depth after 1985 - prior to that it was the average depth.

LENGTH CARD FORMAT

- found on the include file **RvLENac.pas** in AltCol.

```
 RVLEN_INPUT_REC  = record       {column numbers on NEW file}

    CARD_TYPE     :    string [1]; { 1}
    CRUISE        :    string [4]; { 2}
    STATION       :    string [3]; { 6}
    SET_NO        :    string [3]; { 9} {2 before 1984 - 3 after 1983}
    DATE          :    string [6]; {12}
    ICNAF_NAFO    :    string [3]; {18}
    EXPERIMENT    :    string [1]; {21}
    SPECIES       :    string [4]; {22}
    NO_SAMPLED    :    string [4]; {26}
{*} RATIO         :    string [2]; {30} {after 1985 wt caught & wt sam}
    SEX           :    string [1]; {32}
    LEN_INT       :    string [1]; {33} {before 86, FREE adjusted to "11"}
    UNITS         :    string [1]; {34} {after 86, 2 separate variables}
    RECORD_NO     :    string [1]; {35}
    GROUPING      :    string [1]; {36}
    START_LEN     :    string [3]; {37}
    LEN           :    array [1..14] of string [3]; {40}
end;                                                {81 - last character}
```

* before 1986 the ratio was calculated by the coder - after 1985 the weight caught and weight sampled are entered and the ratio is calculated as:

$$\frac{\text{weight sampled x 100}}{\text{weight caught}}$$

The ratio value is calculated by the computer and rounded to 2 digits (nearest percent) for storage purposes. It is important for those calculating the number caught for the catch card to round off the ratio value before it is used to multiply the number measured.

BIOLOGICAL (FISH) CARD FORMAT

- found on the include file **RvBIOac.pas** in AltCol.

```
     RVBIO_INPUT_REC  = record        {column numbers on NEW file}

          CARD_TYPE     : string [1]; { 1}
          CRUISE        : string [4]; { 2}
          STATION       : string [3]; { 6}
          SET_NO        : string [3]; { 9} {2 before 1984 - 3 after 1983}
          DATE          : string [6]; {12}
          ICNAF_NAFO    : string [3]; {18}
          EXPERIMENT    : string [1]; {21}
          DEPTH_GEAR    : string [3]; {  } {dropped after 1985}
          TEMP_GEAR     : string [3]; {  } {dropped after 1985}
          TIME_BEG      : string [3]; {  } {dropped after 1985}
          BOTTOM        : string [1]; {22}
          SPECIES       : string [4]; {23}
          RECORD_NO     : string [1]; {27}
          FISH_NO       : string [4]; {28}
          LENGTH        : string [3]; {32}
          SEX           : string [1]; {35}
{order}   MATURITY      : string [1]; {36}                   {see below for}
{on card} WEIGHT        : string [5]; {37}                   {additional codes}
  {1*}    STOMACH_CON   : string [1]; {42} {variable: 0=st con, 1=st type}
  {3*}    ST_VOLUME     : string [5]; {43} {variable: 0=st vol, 1=st wt}
  {2*}    ST_NO_SPEC    : string [2]; {48} {variable: 0=no sp, 1=st full.}
  {4*}    ST_PART       : string [2]; {50} {variable: 0=part, 1=stand len.}
  {6*}    ST_SP_CODE    : string [4]; {52} {variable: 0=sp code, 1=gonad wt}
          AGE_MATERIAL  : string [1]; {56}
          AGE_ANNULI    : string [2]; {57}
          AGE_EDGE      : string [1]; {59}
          AGE_CHECK     : string [3]; {60}
          AGE           : string [2]; {63}
          YEAR_CLASS    : string [2]; {65}
          AGER          : string [1]; {67}
          FREE          : string [2]; {  } {removed after 1985}
  {5*}    PARASITE      : string [3]; {68} {variable: 0=para., 1=liver wt}
          FIELD_DEFN    : string [6]; {71} {occurs after 1985}
        end;                          {76 - last character}
```

* - these six fields have been made VARIABLE with the addition of a six character field called a field FIELD_DEFN. If this field is blank or zero all the variables have their historic values. If there is a value in FIELD_DEFN then one or more of the fields have been altered. Eg. to change PARASITE from its past value to liver weight in grams, FIELD_DEFN would be '_____1'.

SEE NEXT PAGE ....

{ CODES for FIELD DEFINITION on biological data card

FIELD /cols	HEADING (on data form)	ORIGINAL VALUE (pre 1986)	CODE	PARAMETER
1. 42-42	Stomach type	Stomach condition	0	Stomach condition
			1	Stomach type
			2	Tagging character
2. 48-49	Stomach full	No. spec in stom.	0	No species in stomach
			1	Stomach full (1/10,2/10,etc)
			2	Standard length in cm.
			3	Stomach weight - no contents
3. 43-47	Stomach weight	Stomach volume	0	Stomach volume
			1	Stomach weight - with cont.
			2	Fish weight (2nd reading) g
			3	Girth in mm.
			4	Tag number
			5	Gutted weight in g
4. 50-51	..blank	Stomach part	0	Stomach part
			1	Standard length in cm.
5. 68-70	..blank	Parasite	0	Parasite
			1	Liver weight in g
			2	1st dorsal length in cm.
6. 52-55	Gonad weight	Stom spec code	0	Stomach spec code
			1	Gonad weight in g
			2	Head off weight in g

end of codes}

These are a complete list of codes used until January 1990.

Appendix I

- a series of batch files and short programs written in UTAH Fortran to produce command files for the commercial package SuperSort. These batch files sort RV data files and select subsets of the data.

Documentation to run : **RVSORT**

This is a batch file to take research vessel data in the old Maritimes (St. Andrews) format or the current Gulf format and reformat it to a standardized common format.

Included in this standardization are such things as:
1. adding a data version number to the set card,
2. making all strata numbers '4xx',
3. zero filling, and
4. sorting.

This batch file calls five programs. These are:
1. RVSET a short UTAH Fortran program that queries the user as to the cruise to be processed, it then creates command files to control the sort routine, one for each of the four data card types (set,catch,length, and biological).
2. AltCol is a TURBO PASCAL program to standardize and reformat the data. It queries the user as to the cruise and card type to be processed.
3. TRIM is a public domain assember language utility that strips trailing blanks and blank lines from files.
4. SORT is the commercial program SUPER SORT that is used to sort the four data card types.
5. PKARC is an assembler shareware program that compresses and archives the data; both the original and the new data are compressed and archived. The old data (RVXnnn?.DAT) is archived as RVXnnn.ARC and the new data as RVXnnnN.ARC. All the above use Xnnn to designate the cruise ie. P244 or H159.

In order to run this procedure type

```
RVSORT Xnnn
```

where Xnnn is the cruise designation. After this step respond to the queries.

Remember the space between the replaceable parameter Xnnn and RVSORT.

Note the printer must be on to provide an audit trail.

-xXx-

This is the batch file **RVSORT.BAT**

```
echo processing of data for cruise %1 > PRN
RVSET
ask do you wish to run AltCol ver 2.04 ?  Y/N
IF ERRORLEVEL 1 GOTO NOKEY
echo running AltCol ver 2.04 > PRN
AltCol
:NOKEY
echo beginning set data .... > PRN
trim -0 <d:rv%1s.NEW >d:rv%1s.TMP
SORT CF=SETSORT > PRN
del d:rv%1s.TMP
del d:rv%1s.NEW
ren d:rv%1s.SRT d:rv%1s.NEW
echo beginning catch data .... > PRN
trim -0 <d:rv%1c.NEW >d:rv%1c.TMP
SORT CF=CATSORT > PRN
del d:rv%1c.TMP
del d:rv%1c.NEW
ren d:rv%1c.SRT d:rv%1c.NEW
echo beginning length data .... > PRN
trim -0 <d:rv%1l.NEW >d:rv%1l.TMP
SORT CF=LENSORT > PRN
del d:rv%1l.TMP
del d:rv%1l.NEW
ren d:rv%1l.SRT d:rv%1l.NEW
echo beginning biological data .... > PRN
trim -0 <d:rv%1b.NEW >d:rv%1b.TMP
SORT CF=BIOSORT > PRN
del d:rv%1b.TMP
del d:rv%1b.NEW
ren d:rv%1b.SRT d:rv%1b.NEW
SET pkarctmp = d:
d:
echo pkarc a b:rv%1  d:rv%1?.DAT > PRN
a:pkarc a b:rv%1  d:rv%1?.DAT > PRN
echo pkarc a b:rv%1n d:rv%1?.NEW > PRN
a:pkarc a b:rv%1n d:rv%1?.NEW > PRN
a:pkarc v b:rv%1 > PRN
a:pkarc v b:rv%1n > PRN
dir b: > PRN
a:
copy rv%1s.ver b:
```

For this implimentation to work, the following should be in place:

program disk in default drive
blank disk in B: for archived data
research vessel data in D:
printer on to provide audit trail

Research Vessel Analysis

Documentation to run : **SELECT**

This is a batch file to take research vessel data in the new format (RVXnnn?.NEW) and select subsets of this data on the basis of species, strata, and time. The selection criteria must be completed 1 at a time, ie. species then strata.

Files that are subsets by species are named RVXnnn?.SPP where Xnnn is the cruise designation and SPP is the 3 letter species code. Files selected for strata have the extention .SEL. The extention found on a file only indicates the last selection program through which it passed. Selections for time of day rename the cruise.

This batch file calls four programs. These are:

1. SELSP, SELST, SELTM are short UTAH Fortran programs that query the user as to the cruise to be processed and the selection criteria; it then creates command files to control the sort routine, one for each of the four data card types (set,catch,length, and biological), additional procedure files are created to process the sort (select) and archive functions.
2. TRIM is a public domain assember language utility that strips trailing blanks and blank lines from files,
3. SORT is the commercial program 'SuperSort' that is used to select the appropriate subsets of the four data card types.
4. PKARC is an assembler shareware program that compresses and archives the data. The new subset of the data is compressed and archived. The new data is archived as SPXnnn.ARC if the selection was based on species, STXnnn.ARC if the selection was based on strata, and TMXnnn.ARC if based on time. All the above use Xnnn to designate the cruise ie. P244 or H159. There is no way of identifying what specific selections were done on an archived subset - only that the last selection was based on time, species, or strata.

In order to run this procedure type

```
SELECT Xnnn
```

where Xnnn is the cruise designation. After this step respond to the queries. Multiple runs are necessary if more than one type of selection is required.

Remember the space between the replaceable parameter Xnnn and SELECT.

Note printer must be on to provide a paper audit trail.

-xXx-

This is the batch file **RVSELECT.BAT**

```
echo processing of data for cruise %1 > PRN
ask do you wish to select for SPECIES ?  Y/N
IF ERRORLEVEL 1 GOTO STRATA
echo running SELSP ver 1.00 > PRN
SELSP
echo NO set data in SPECIES selection .... > PRN
echo beginning catch data .... > PRN
trim -0 <d:rv%1c.NEW >d:rv%1c.TMP
SORT CF=CSELSP > PRN
del d:rv%1c.TMP
echo beginning length data .... > PRN
trim -0 <d:rv%1l.NEW >d:rv%1l.TMP
SORT CF=LSELSP > PRN
del d:rv%1l.TMP
echo beginning biological data .... > PRN
trim -0 <d:rv%1b.NEW >d:rv%1b.TMP
SORT CF=BSELSP > PRN
del d:rv%1b.TMP
goto arc
:STRATA
ask do you wish to select by STRATA ? Y/N
IF ERRORLEVEL 1 GOTO TIME
echo running SELST ver 1.00 > PRN
SELST
prosel %1
goto arc
:TIME
ask do you wish to select by TIME ? Y/N
IF ERRORLEVEL 1 GOTO ARC
echo running SELTM ver 1.00 > PRN
SELTM
:ARC
sparc
```

For this implimentation to work the following should be in place:

program disk in default drive
blank disk in B: for archived data
research vessel data in D:
printer on to provide audit trail

It is possible to run only the program **SELST** and then run the procedure **PROSEL**.

In order to run this procedure type

```
PROSEL Xnnn
```

where Xnnn is the cruise designation. Multiple runs are necessary if more than one type of selection is required.

Remember the space between the replaceable parameter Xnnn and PROSEL.

This is the batch file **PROSEL.BAT** (PROcess SELection)

```
echo beginning set data .... > PRN
trim -0 <d:rv%1s.NEW >d:rv%1s.TMP
SORT CF=SSELST > PRN
del d:rv%1s.TMP
echo beginning catch data .... > PRN
trim -0 <d:rv%1c.NEW >d:rv%1c.TMP
SORT CF=CSELST > PRN
del d:rv%1c.TMP
echo beginning length data .... > PRN
trim -0 <d:rv%1l.NEW >d:rv%1l.TMP
SORT CF=LSELST > PRN
del d:rv%1l.TMP
echo beginning biological data .... > PRN
trim -0 <d:rv%1b.NEW >d:rv%1b.TMP
SORT CF=BSELST > PRN
del d:rv%1b.TMP
```

This batch file and those above make use of such public domain utilities as TRIM and ASK. These are available in machine language code on most bulletin boards.

The Fortran program **RVSET.FOR**

```
***** UTAH Fortran 1.0 (Mod 2) ** Compiling File: A:RVSET.FOR *****

$OPTIONS X,E,L=250,S=250
C     PROGRAM TO CREATE COMMAND FILES FOR SUPERSORT TO
C     SORT RVDATA FILES
C
C           RVSET       ver  1.00
C                       Douglas Clay
C                       MARINE AND ANADROMOUS FISHERIES DIVISION
C                       GULF FISHERIES CENTER, MONCTON
C
      DIMENSION FILE (4)
      IOW = 0
      IOR = 1
C
      WRITE (IOW,1)
1     FORMAT (' NAME OF CRUISE TO PROCESS > ',Z)
      READ (IOR,2) FILE
2     FORMAT (4A1)
      CALL OPEN (2,'SETSORT')
      WRITE (2,3) FILE,FILE
3     FORMAT ('list',/,'inp=90 , cr'         ,/,
     >                 'key=9 11'             ,/,
     >                 'work = d:'            ,/,
     >                 'SO=D:RV',4A1,'S.TMP' ,/,
     >                 'OUT=D:RV',4A1,'S.SRT',/,
     >                 'GO'                   ,//)
      CALL CLOSE (2)
      CALL OPEN (2,'CATSORT')
      WRITE (2,13) FILE,FILE
13    FORMAT ('list',/,'inp=90 , cr'         ,/,
     >                 'key=9 11 , 41 44'     ,/,
     >                 'work = d:'            ,/,
     >                 'SO=D:RV',4A1,'C.TMP' ,/,
     >                 'OUT=D:RV',4A1,'C.SRT',/,
     >                 'GO'                   ,//)
      CALL CLOSE (2)
      CALL OPEN (2,'LENSORT')
      WRITE (2,23) FILE,FILE
23    FORMAT ('list',/,'inp=95 , cr'         ,/,
     >                 'key=9 11 , 22 25 , 32 32 , 37 39',/,
     >                 'work = d:'            ,/,
     >                 'SO=D:RV',4A1,'L.TMP' ,/,
     >                 'OUT=D:RV',4A1,'L.SRT',/,
     >                 'GO'                   ,//)
      CALL CLOSE (2)
      CALL OPEN (2,'BIOSORT')
      WRITE (2,33) FILE,FILE
```

```
0023 33     FORMAT ('list',/,'inp=85 , cr'         ,/,
        >                    'key=9 11,right 23,26,right',/,
        >                    'key    +28,31,right 27,27,right',/,
        >                    'work = d:'           ,/,
        >                    'SO=D:RV',4A1,'B.TMP' ,/,
        >                    'OUT=D:RV',4A1,'B.SRT',/,
        >                    'GO'                  ,//)
0024        CALL CLOSE (2)
0025        STOP
0026        END
** Generated Code =   938 (Decimal), 03AA (Hex) Bytes


      No Compile errors
```

The Fortran program **SELSP.FOR**

```
***** UTAH Fortran 1.0 (Mod 2) ** Compiling File: A:SELSP.FOR *****

0001 $OPTIONS X,E,L=250,S=250
     C      PROGRAM TO CREATE COMMAND FILES FOR SUPERSORT TO
     C      SELECT SPECIFIC SPECIES SUBSETS OF DATA FROM RVDATA FILES
     C
     C              SELSP     ver  1.00     12/jan/87
     C                        DOUGLAS CLAY , MAFD , DFO
     C                        GULF FISHERIES CENTER , MONCTON
     C
0002        DIMENSION FILE (4) , SPEC (3) , SEL (3)
     C
0003        IOW = 0
0004        IOR = 1
     C
0005        WRITE (IOW,1)
0006 1      FORMAT (' NAME OF CRUISE TO PROCESS > ',Z)
0007        READ (IOR,2) FILE
0008 2      FORMAT (4A1)
     C
0009           WRITE (IOW,*) ' 3 LETTER ALPHA CODE FOR SPECIES'
0010           READ (IOR,2) (SPEC(I),I=1,3)
0011           WRITE (IOW,*) ' NUMBERIC CODE 4 DIGITS include leading 0"s'
0012           READ (IOR,3) ISPEC
0013 3         FORMAT (A4)
0014           WRITE (IOW,*) ' SElect OR EXclude SPECIES'
0015           READ (IOR,2) (SEL(I),I=1,2)
     C
0016        CALL OPEN (2,'CSELSP')
0017        WRITE (2,13) FILE,FILE,SPEC,(SEL(I),I=1,2),ISPEC
```

```
     13    FORMAT ('list',/,'inp=90 , cr'          ,/,
          >                  'key=41 44'           ,/,
          >                  'work = d:'           ,/,
          >                  'SO=D:RV',4A1,'C.TMP' ,/,
          >                  'OUT=D:RV',4A1,'C.'3A1,/,
          >                   2A1'  FIELD 41,44 = "'A4'"',/,
          >                  'GO'                  ,//)
           CALL CLOSE (2)
           CALL OPEN (2,'LSELSP')
           WRITE (2,23) FILE,FILE,SPEC,(SEL(I),I=1,2),ISPEC
     23    FORMAT ('list',/,'inp=95 , cr'          ,/,
          >                  'key=22 25'           ,/,
          >                  'work = d:'           ,/,
          >                  'SO=D:RV',4A1,'L.TMP' ,/,
          >                  'OUT=D:RV',4A1,'L.'3A1,/,
          >                   2A1'  FIELD 22,25 = "'A4'"',/,
          >                  'GO'                  ,//)
           CALL CLOSE (2)
           CALL OPEN (2,'BSELSP')
           WRITE (2,33) FILE,FILE,SPEC,(SEL(I),I=1,2),ISPEC
     33    FORMAT ('list',/,'inp=85 , cr'          ,/,
          >                  'key= 23,26,right'    ,/,
          >                  'work = d:'           ,/,
          >                  'SO=D:RV',4A1,'B.TMP' ,/,
          >                  'OUT=D:RV',4A1,'B.'3A1,/,
          >                   2A1'  FIELD 23,26 = "'A4'"',/,
          >                  'GO'                  ,//)
           CALL CLOSE (2)
     C
           CALL OPEN (2,'SPARC.BAT')
           WRITE (2,99) FILE , FILE , SPEC , FILE , FILE , SPEC , FILE
     99    FORMAT ('SET pkarctmp = d:' ,/,  'D:'              ,/,
          >'echo pkarc u b:sp'4A1'  d:rv'4A1'?.',3A1,' > PRN',/,
          >'a:pkarc u b:sp'4A1'  d:rv'4A1'?.',3A1,' > PRN'    ,/,
          >'a:pkarc v b:SP'4A1' > PRN'                        ,/,
          >'dir b: > PRN'   ,/,  'A:')
           CALL CLOSE (2)
           STOP
           END
** Generated Code =  1374 (Decimal), 055E (Hex) Bytes


       No Compile errors
```

The Fortran program **SELST.FOR**

```
$OPTIONS X,E,L=250,S=250
C      PROGRAM TO CREATE COMMAND FILES FOR SUPERSORT TO
C      SELECT SPECIFIC STRATA SUBSETS OF DATA FROM RVDATA FILES
C
C              SELST     ver  1.00     12/jan/87
C                        DOUGLAS CLAY , MAFD , DFO
C                        GULF FISHERIES CENTER , MONCTON
C
      DIMENSION FILE (4) , SPEC (3) , STRATA (3) , NUMBER (10,3)
C
      DATA SPEC(1) /'T'/, SPEC(2) /'M'/, SPEC(3) /'P'/, S /'S'/,
     >          SS /'s'/
C
      IOW = 0
      IOR = 1
C
      WRITE (IOW,1)
1     FORMAT (' NAME OF CRUISE TO PROCESS > ',Z)
      READ (IOR,2) FILE
2     FORMAT (4A1)
C
      WRITE (IOW,*) ' SELECTION FROM MASTER OR SPECIES SUBSET? M/S'
      READ (IOR,2) SP
      IF (SP.EQ.S .OR. SP.EQ.SS) THEN
         WRITE (IOW,*) ' 3 LETTER ALPHA CODE FOR SPECIES'
         READ (IOR,2) (SPEC(I),I=1,3)
      ENDIF
C
         WRITE (IOW,*) ' SElect or EXclude '
         READ (IOR,2) (STRATA(I),I=1,2)
         WRITE (IOW,*) ' HOW MANY STRATA TO IDENTIFY : MAX 10'
         READ (IOR,*) ISTRAT
         WRITE (IOW,*) ' ENTER STRAT NUMBER : 1 PER LINE '
         DO 12 I = 1, ISTRAT
12       READ (IOR,2) (NUMBER (I,J),J=1,3)
C
      CALL OPEN (2,'SSELST')
      WRITE (2,3) FILE,SPEC,FILE,(STRATA(I),I=1,2)
3     FORMAT ('list',/,'inp=90 , cr'         ,/,
     >                 'work = d:'           ,/,
     >                 'SO=D:RV',4A1,'S.',3A1,/,
     >                 'OUT=D:RV',4A1,'S.SEL',/,
     >                 'KEY=6 8'             ,/,
     >                  2A1'  FIELD 6,8 =',Z)
      WRITE (2,30) (NUMBER(1,J),J=1,3)
30    FORMAT ('"',3A1,'" ',Z)
      IF (ISTRAT.GT.1) THEN
        DO 4 I = 2 , ISTRAT
4       WRITE (2,5) (NUMBER(I,J),J=1,3)
5       FORMAT (' &&',/,'OR FIELD 6,8 = "',3A1,'" ',Z)
      ENDIF
      WRITE (2,6)
6     FORMAT (/,'GO',//)
      CALL CLOSE (2)
C
      CALL OPEN (2,'CSELST')
      WRITE (2,13) FILE,SPEC,FILE,(STRATA(I),I=1,2)
13    FORMAT ('list',/,'inp=90 , cr'         ,/,
     >                  'key=6 8'             ,/,
     >                  'work = d:'           ,/,
     >                  'SO=D:RV',4A1,'C.',3A1,/,
     >                  'OUT=D:RV',4A1,'C.SEL',/,
     >                   2A1'  FIELD 6,8 = ',Z)
      WRITE (2,30) (NUMBER(1,J),J=1,3)
      IF (ISTRAT.GT.1) THEN
        DO 40 I = 2 , ISTRAT
40      WRITE (2,5) (NUMBER(I,J),J=1,3)
      ENDIF
      WRITE (2,6)
      CALL CLOSE (2)
C
      CALL OPEN (2,'LSELST')
      WRITE (2,23) FILE,SPEC,FILE,(STRATA(I),I=1,2)
23    FORMAT ('list',/,'inp=95 , cr'         ,/,
     >                  'key=6 8'             ,/,
     >                  'work = d:'           ,/,
     >                  'SO=D:RV',4A1,'L.'3A1 ,/,
     >                  'OUT=D:RV',4A1,'L.SEL',/,
     >                   2A1'  FIELD 6,8 = ',Z)
      WRITE (2,30) (NUMBER(1,J),J=1,3)
      IF (ISTRAT.GT.1) THEN
        DO 41 I = 2 , ISTRAT
41      WRITE (2,5) (NUMBER(I,J),J=1,3)
      ENDIF
      WRITE (2,6)
      CALL CLOSE (2)
C
      CALL OPEN (2,'BSELST')
      WRITE (2,33) FILE,SPEC,FILE,(STRATA(I),I=1,2)
33    FORMAT ('list',/,'inp=85 , cr'         ,/,
     >                  'key= 6 8 '           ,/,
     >                  'work = d:'           ,/,
     >                  'SO=D:RV',4A1,'B.'3A1 ,/,
     >                  'OUT=D:RV',4A1,'B.SEL',/,
     >                   2A1'  FIELD 6,8 = ',Z)
      WRITE (2,30) (NUMBER(1,J),J=1,3)
      IF (ISTRAT.GT.1) THEN
        DO 42 I = 2 , ISTRAT
42      WRITE (2,5) (NUMBER(I,J),J=1,3)
      ENDIF
      WRITE (2,6)
      CALL CLOSE (2)
C
```

```
      CALL OPEN (2,'PROSEL.BAT')
C     WRITING PROCEDURE TO DO THE SELECTION
      IF (SP.EQ.S .OR. SP.EQ.SS) THEN
        WRITE (2,70)
70      FORMAT ('echo beginning set data .... > PRN',          /,
     >          'SORT CF=SSELST > PRN',                        /,
     >          'echo beginning catch data .... > PRN',        /,
     >          'SORT CF=CSELST > PRN',                        /,
     >          'echo beginning length data .... > PRN',       /,
     >          'SORT CF=LSELST > PRN')
        WRITE (2,71)
71      FORMAT ('echo beginning biological data .... > PRN', /,
     >          'SORT CF=BSELST > PRN')
      ELSE
        WRITE (2,80)
80      FORMAT ('echo beginning set data .... > PRN',          /,
     >          'trim -0 <d:rv%1s.NEW >d:rv%1s.tmp',           /,
     >          'SORT CF=SSELST > PRN',/,'del d:rv%1s.tmp',    /,
     >          'echo beginning catch data .... > PRN',        /,
     >          'trim -0 <d:rv%1c.NEW >d:rv%1c.tmp',           /,
     >          'SORT CF=CSELST > PRN',/,'del d:rv%1c.tmp')
        WRITE (2,81)
81      FORMAT ('echo beginning length data .... > PRN',       /,
     >          'trim -0 <d:rv%1l.NEW >d:rv%1l.tmp',           /,
     >          'SORT CF=LSELST > PRN',/,'del d:rv%1l.tmp',    /,
     >          'echo beginning biological data .... > PRN',   /,
     >          'trim -0 <d:rv%1b.NEW >d:rv%1b.tmp',           /,
     >          'SORT CF=BSELST > PRN',/,'del d:rv%1b.tmp')
      ENDIF
      CALL CLOSE (2)
C
      CALL OPEN (2,'SPARC.BAT')
      WRITE (2,99) FILE , FILE , FILE , FILE , FILE
99    FORMAT ('SET pkarctmp = d:' ,/,  'D:'                ,/,
     >'echo pkarc u b:st'4A1'  d:rv'4A1'?.SEL > PRN',/,
     >'a:pkarc u b:st'4A1'  d:rv'4A1'?.SEL > PRN'      ,/,
     >'a:pkarc v b:ST'4A1' > PRN'                       ,/,
     >'dir b: > PRN'    ,/,  'A:')
      CALL CLOSE (2)
      STOP
      END
```

Examples of some of the command files produced by these programs are as follows:

the command file **SETSORT** for use with 'SuperSort'

```
list
inp=90 , cr
key=9 11
work = d:
SO=D:RVa010S.TMP
OUT=D:RVa010S.SRT
GO
```

the command file **CSELSP** for use with 'SuperSort'

```
list
inp=90 , cr
key=41 44
work = d:
SO=D:RVP188C.TMP
OUT=D:RVP188C.PLA
SE  FIELD 41,44 = "0040"
GO
```

the command file **LSELST** for use with 'SuperSort'

```
list
inp=95 , cr
key=6 8
work = d:
SO=D:RVP079L.TMP
OUT=D:RVP079L.SEL
SE  FIELD 6,8 = "415"  &
OR FIELD 6,8 = "416"  &
OR FIELD 6,8 = "417"  &
OR FIELD 6,8 = "418"  &
OR FIELD 6,8 = "419"
GO
```

Appendix II a.

"CheckIT" User Notes

by
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Getting Started

(Recommended protocols for current implementation)

Ensure the CheckIT programs and assessory files (*.PAR, strata.DAT, etc.) are on Bernoulli Drive C:. If on an alternate default drive, change the parameter file CheckIT.PAR accordingly. The data to be edited should be on Bernoulli Drive D:. The file names should follow the form RVXnnn (S, C, L or B).DAT card types, where Xnnn is the cruise Id of the survey data to be edited.

Ensure that you are logged in the appropriate sub-directories.

Verify that the cruise (Id) to be edited and the date of the cruise are in the CRUZYR.PAR file (add if necessary) and confirm that the options selected in the parameter file CheckIT.PAR reflect your system and data specifications. The edit program CheckIT edits the data in the standardized format (*.NEW); however, all corrections should be made on the original data files (*.DAT). These 'corrected' original data files must then be 'standardized' again by running the program AltCol.

Running Edit System

1. CkClean

This batch file deletes extraneous files from Drive D: (i.e. *.BAK, *.TMP, *.err, etc.)

See Appendix A for listing of the CkClean batch file.

2. AltCol

This Turbo Pascal program standardizes the formats of the RVXnnn (S, C, L or B).DAT files creating RVXnnn (S, C, L or B).NEW files and ensures compatibility between the old (pre-1984) and new data formats.

3. CkSort Xnnn

This batch file uses "SuperSort" routines to sort the standardized data files into orders for the subsequent CheckIT edits.

When you reply to the prompt "test number to be run?" a "SuperSort" command file is created that sorts the data files into orders compatible with that specific CheckIT test.

Make sure to leave a space between the command CkSort and the replaceable parameter 'cruise Id' (i.e. CkSort Xnnn).

CkClean must be run before each run of CkSort.

See Appendix B for a listing of the CkSort batch file and the "SuperSort" command files.

4. After these procedures there are often garbled records of blank lines at the beginning of the file. With 'Wordstar' delete (using <ctrl> T) any blank lines or extraneous characters from the beginning of the standardized data files and add one blank line (= 2 CR) at the end of each of these files.

This step is necessary every time CkSort is run.

5. CheckIT

This Turbo Pascal program has 11 options - 8 of which are actual editing tests.

The CheckIT menu contains a description of the sort sequence required of the data files for each of the eight CheckIT tests. If you select a test for which the data files are incorrectly sorted, you can abort the test by replying <ctrl> C to abort at any prompt. At this point the files must be resorted correctly with CkSort by replying to the prompt 'test number to be run?'

Make changes/corrections to the RVXnnn (S, C, L or B).DAT files only.

Always run CkClean before running CkSort.

Remember that a space is required between CkSort and the replaceable parameter 'cruise Id' (Xnnn).

Remember to add or verify that a blank line (= 2 CR) exists at the end of each of the standardized data files.

See Appendix C for CheckIT menu and the parameter file CheckIT.PAR.

Procedure for Editing Length/Weight Data
CheckIT: Test #8

1. Run the Turbo Pascal program BioFreq for each of the species of interest. The options selected in the parameter file BioFreq.PAR should result in the production of files of length/weight values (one file per species). This program creates file names with the following protocols: XnnnSpec.XYW where Xnnn is the cruise Id and Spec is the 4 digit species code.

The standardized data files need to be sorted in the same sequence required for CheckIT test numbers 1 to 5. If the files are sorted in some other order, use CkSort and select any test number from 1 to 5.

2. RegPlt XnnnSpec.XYW

Run the batch file RegPlt for each of the species files created in the above step. This will provide scatter plots and regression equations for each of the length/weight distributions. This routine calls the programs REGAN and SCATER.

Remember that a space is required between RegPlt and the replaceable parameter filename (XnnnSpec.XYW).

See Appendix D for a list of the batch file RegPlt.

3. Locate any obvious outliers on the scatter plots (note that several plots are produced (with different X/Y scales). This is to facilitate examination at the extremes of the distributions.

4. Identify which biological records require editing by using the REGRESSION (test #8) output to cross-reference the specific line numbers of the outliers found on the above plots.

5. Outliers may be the result of errors in the length, weight or both. Use the REGRESSION test output to ascertain the possible cause in each case (note the predicted lengths and weights).

Beware of errors due to 'dropped digits' i.e. when a fish was actually 110 g rather than 10 g.

Beware of errors due to confusion of metric/imperial units on weighing scales and correct accordingly.

6. Correct or delete the errors on the original data files (*.DAT) as with the other tests.

7. Rerun the LENCAT (test #6) and BIOCAT (test #5) tests as changes will probably be required to the catch and length data files.

Merging Ageing and Biological Data

1. Run the batch file CkClean.

2. Confirm that the format of the age file is correct - these records are not comma delimited (see Appendix E: for sample).

3. Copy the age file to be added (one species per file) to the data drive (D:) using the following naming protocol: XnnnAGE.Spp.

Where Xnnn is the cruise Id (i.e. H166 for cruise 166 on the Lady Hammond) and Spp is a three character abbreviation for the species being merged (i.e. WPF for window pane flounder). (See Appendix E: for a sample of file H166AGE.WPF.)

4. CkAge Xnnn Spp

Run the batch file CkAge, this file uses 'SuperSort' to sort the age file (XnnnAGE.Spp) by fish number.

Make sure to leave a space between the command CkAge and the first replaceable parameter, 'cruise Id' (Xnnn), and the second replaceable parameter, the abbreviation for the species (Spp) that was aged (i.e. CkAge Xnnn Spp).

The number of records sorted should match the number of fish aged.

See Appendix F for listing of the batch file and the 'SuperSort' command file.

5. CkSelect Xnnn Spp

Run the batch file CkSelect; this file uses 'SuperSort' to select the biological records for the species that is to be merged from the standardized biological data file and then sort these records by fish number.

Make sure to leave a space between the command CkSelect and the first replaceable parameter, 'cruise Id' (Xnnn), and the second replaceable parameter, the abbreviation for the species (Spp) that was aged (i.e. CkSelect Xnnn Spp).

See Appendix G for listing of the batch file and the 'SuperSort' command files.

This batch file calls the routine SELSP. The reply to the prompts for: "Name of cruise to process", "3 letter alpha code for species", and "Numeric species code - 4 digits including leading 0's" are the same as those used with the starting command CkSelect Xnnn Spp.

Enter SE to select records.

After this the Turbo Pascal program FILES is called by the batch file. This interactive program proceeds as follows:

Remember the drive designations when prompted for file names.

When prompted: "Please enter the full name of the age file",
reply: D:XnnnSRT.Spp, where Xnnn is the cruise Id and Spp is the 3 character species code.

When prompted: "Please enter the full name of the fish file",
reply: D:RVXnnnB.Spp.

When prompted: "Please enter the full name of the target merge file",
reply: D:Merge.

When prompted: "Please enter the full name of the error file",
reply: D:Error.

When prompted: "Do you wish to produce an error message file (Y/N)?",
reply: Y

When prompted: "There are ___ errors in these files"
"There are ___ warning(s) for these files"
"There are ___ reason(s) to panic"
"Do you wish to merge the files now (Y/N)?"

reply: N (unless all responses above are zero).

With 'Wordstar' examine the error file and correct any problems on the original standardized file (i.e. *.NEW) before attempting to merge the sorted age and biological records. Run FILES after correcting any errors to get new error messages.

6. CkMerge Xnnn

Do not run CkClean before running CkMerge.

Run the batch file CkMerge; this file uses 'SuperSort' to exclude the biological records for the species that has been merged with the ages and then merges this file with the file with the ages.

Make sure to leave a space between the command CkMerge and the replaceable parameter, 'cruise Id' (Xnnn) (i.e. CkMerge Xnnn).

See Appendix H for a listing of the batch file CkMerge and the 'SuperSort' command file SpSort (this files is not created in the run and must be present on the system).

This batch file calls the routine SELSP. The replies to the prompts are the same as those used when you ran CkSelect except enter EX to exclude records and when prompted: "3 letter alpha code for species", you must enter OTH for other species. Enter the same numeric code as you did when running CkSelect.

The number of records excluded should match the number of records selected in CkSelect.

The single species biological file with the ages is then added to the larger biological file having all species except the species being merged.

With 'Wordstar' verify that the file created (RVXnnnB.TMP) is correct, then exit with command <ctrl> KQ. Ensure the union of the two files is also correct. Upon exiting from Wordstar the the *.TMP file is renamed RVXnnnB.ALL.

7. Copy D:RVXnnnB.ALL to D:RVXnnnB.NEW/V.

8. Compare the original RVXnnnB.DAT file with the standardized RVXnnnB.NEW file by typing one 'page' from each of these files (use <shift> Print Screen) and verify that the formats are identical.

If there are no differences, then copy D:RVXnnnB.NEW to D:RVXnnnB.DAT.

9. Run the batch file CkClean.

10. If the .DAT file was replaced in step 8 above, then run AltCol, otherwise do not run AltCol as you will lose your newly added ages.

11. Run the batch file CkSort Xnnn and proceed with the remaining edits in CheckIT.

Remember the space between the command CkSort and the replaceable parameter 'cruise Id' (i.e. CkSort Xnnn).

12. By this stage the research vessel data has passed through all of the editing tests in CheckIT. At this time the user should preview the summaries of the SET and CATCH cards by running DataLst.

Appendix A.

Batch file CkClean used in edit system.

```
del d:*.SRT
del c:*.OUT
del c:*.OU1
del c:*.OU2
del d:*.TMP
del d:*.BAK
del d:errors
del d:error
del d:merge
```

Appendix B.

Batch file CkSort used in edit system.

```
ren d:rv%1?.NEW rv%1?.TMP
rvset
sort cf=setsort
sort cf=catsort
sort cf=lensort
sort cf=biosort
ren d:rv%1?.SRT rv%1?.NEW
```

Appendix C.

The parameter file CheckIT.PAR used by the edit system CheckIT.

```
LST:          :  output file name   lst:  =  printer
d:            :  bioDrive
d:            :  lenDrive
d:            :  catDrive
d:            :  setDrive
c:            :  speciesDrive
c:            :  strataDrive
              :  PrintOptions
4             :  RightMargin
4             :  LeftMargin
60            :  LinesPerPage
80            :  CharPerLine
0.25          :  RegFuzzFactor for SPdistance
0.35          :  RegFuzzFactorW for L/W regression test
0.10          :  RegFuzzFactorL for L/W regression test
0.9           :  SetCatLow  {Set Catch Validation acceptable weight
1.1           :  SetCatHigh  ratio range as Catch / Set}
0.01          :  Tolerance
n             :  deBug1     Y/N  audit trail for line by line reading
n             :  deBug2     Y/N  tracing set and species
n             :  deBug3     Y/N  audit of regress,
N             :  deBug4     Y/N  invert listing
```

The on screen menu as it appears with the edit system CheckIT

```
      T e s t                  D e f a u l t      S o r t
                               F i l e            O r d e r


 1) Range Test    ..........  Range.PAR      SORTED:SET/SPEC/FISH_NO
 2) Set Validation  ........  Set.PAR           "
 3) Catch Validation  ......  Cat.PAR           "
 4) Set/Catch Validation ...  SetCat.PAR        "
 5) Bio/Catch Validation ...  BioCat.PAR        "
 6) Len/Catch Validation ...  LenCat.PAR    SORTED:SPEC/SET/FISH_NO
 7) Biological Validation ..  Bio.PAR       SORTED:SPEC/FISH_NO/SET
 8) Regression Test ........  Reg.PAR           "
 9) Report  ................  run DataLst
10) Plot Data   ............  run DataLst & BioFreq
99) EXIT  ..................  return to DOS
```

Appendix D.

Batch file RegPlt used in the CheckIT edit system.

```
del REGAN.NEW
del REGAN.OUT
del REGAN.DAT
del SCATER.NEW
del SCATER.DAT
copy %1 REGAN.DAT/v
REGAN < REGAN.INP
print REGAN.OUT
ren REGAN.DAT SCATER.DAT
del SCATER.OUT
SCATER < SCATER.INP
print SCATER.OUT
del SCATER.OU1
SCATER < SCATER.IN1
print SCATER.OU1
del SCATER.OU2
SCATER < SCATER.IN2
print SCATER.OU2
del REGAN.DAT
del REGAN.NEW
del SCATER.NEW
del SCATER.DAT
```

Appendix E.

Sample age file (H166AGE.WPF) of ages read from hard parts.

```
9H1660143   1    995   99996
9H1660143   2     44    4826
9H1660143   3     64    6806
9H1660143   4     34    3836
9H1660143   5     51    4826
9H1660143   6     64    6806
9H1660143   7     54    5816
9H1660143   8     34    3836
9H1660143   9     34    3836
9H1660143  10     54    5816
```

Appendix F.

Batch file CkAge.BAT used in the edit system.

```
copy d:%1age.%2 d:age.TMP
sort cf=agesort
ren d:age.SRT %1srt.%2
```

Appendix G.

Batch file CkSelect.BAT used in the edit system.

```
copy d:rv%1b.NEW d:rv%1b.TMP/v
SELSP
SORT CF=BSELSP
ren d:rv%1b.%2 SpNoAge.TMP
sort cf=SpSort
ren D:SpNoAge.SRT rv%1b.%2
FILES
```

Appendix H.

```
copy d:rv%1b.NEW d:rv%1b.TMP/v
SELSP
SORT CF=BSELSP
copy d:merge + d:rv%1b.OTH d:rv%1b.TMP/v
ws4 d:rv%1b.TMP
copy d:rv%1b.TMP d:rv%1b.ALL
dir d:rv%1?.*
```

Command file SpSort used by 'SuperSort'.

```
list
inp=85 , cr
key=  28,31,right
work = d:
SO=D:SpNoAge.TMP
OUT=D:SpNoAge.SRT
GO
```

R esearch V essel AN alysis

APPENDIX II b.

CheckIT program documentation

Purpose

This program is used to perform a data validation procedure on data files. The program accepts directives describing range and value attributes of data items and record descriptions containing an internal file name, the name, type and columnar location of each variable on the file with an optional specification of range and value checks to be performed.

A second set of file specific tests is also incorporated, these tests require that a file contain variables with a specific name and that the files required be previously defined.

This implimentation of CheckIT is a Pascal program designed to edit the research vessel data. Data for one cruise is stored in four files, each file corresponding to a card type.

1. SET cards	RV + 'Xnnn' + S.NEW
2. CATCH cards	RV + 'Xnnn' + C.NEW
3. LENGTH cards	RV + 'Xnnn' + L.NEW
4. BIOLOGICAL cards	RV + 'Xnnn' + B.NEW

PASCAL PROCEDURE DESCRIPTIONS

Various Pascal procedures or tests are included in the program which perform specified tests on the datafiles. Brief descriptions of these are given below.

SETCAT

The Pascal procedure SETCATCH compares the SET cards with the CATCH cards.

Three tests are performed on each set:

1. The number of fish species recorded on the catch cards must equal the number of fish species on the set card.
2. The number of invertebrate species recorded on the catch cards must equal the number of invertebrate species on the set card.
3. The sum of the catch weights for fish species on the catch cards must equal the total fish weight recorded on the set card.

Note: The files must be sorted by set.

BIOCAT

This procedure compares the CATCH cards with the BIOLOGICAL cards.

For each set:
If a biological card is present for a species, a catch card must also be present for that species. If a non-zero is encountered for the number sampled for sex, maturity, weight, or otoliths on the catch card for a species, biological records must also exist for that species. (species code < 1000 only)

Four tests are performed for each species by set:

1. The number sampled for sex on the catch card must equal the number of biological cards with sex information (sex = 0,1,2).

2. The number sampled for maturity on the catch card must equal the number of biological cards with maturity information (maturity <> 9).

3. The number sampled for weight on the catch card must equal the number of biological cards with weight information (weight <> 99999).

4. The number sampled for otoliths on the catch card must equal the number of biological cards with a "1" in the aging material column.

Note: The data must be sorted by species within set.

LENGTH

This procedure compares the CATCH, LENGTH, and BIOLOGICAL cards.

For each set:
If a biological card is present for a species, both catch and length cards must be present for that species.

If a length card is present for a species, a biological card need not be present but a catch card must be present for that species.

Five tests are performed for each species by set:

1. Each length on a biological card must have a corresponding length on a length card.

2. The number of biological cards for a species must not be greater than the number on the length card sampled for length on the catch card.

3. The number sampled for length on the catch cards must equal the number sampled over all length intervals on the length cards.

4. The number sampled for length on the length cards must equal the number sampled over all length intervals on the length cards.

5. The number caught on the catch cards must be within 10% of the number caught as calculated from the number sampled and the ratio on the length cards.

Note: The catch and biological files must be sorted by species within set. The length file must be sorted by sex within species within set.

SPTEST

This procedure checks for internal consistency on the CATCH cards.

The following six tests are performed:

1. The number sampled for length must not be less than the number sampled for sex.
2. The number sampled for length must not be less than the number sampled for maturity.
3. The number sampled for length must not be less than the number sampled for weight.
4. The number sampled for length must not be less than the number sampled for otoliths.
5. The number sampled for length must not be less than the number sampled for parasites.
6. The number sampled for length must not be less than the number sampled for stomachs.

SPDISTANCE incorporated in SPTEST

This procedure checks the distance calculation on the SET card.

The following test is performed:

1. The distance must be within the FuzzFactor listed in the parameter file of speed x time.

Command format

The directive file is composed of statements which may be several lines long. Command statements are identified by having the character in column 1 as '/'. It is considered good practice to leave column 1 blank except for starting a new statement. All statements will be converted to upper case when being read in.

```
example:    /Read    FILE=RANGE.PAR
```

Commands:

/List	redirects output to a specified file
/Read	reads the indicated file for further commands this file will be read until end-of-file or the /Close command is encountered.
/Close	close the active command file. If this is the level 1 command file then the program will terminate.
/Ranges	define range Ids and their associated value pairs.
/Values	define value Ids and their associated values.
/Varlist	define a record name, the number of lines in each data record and the list of variables in that record.
/Test	associate a system file name with an internal record name and read the data in that file performing the type checking and range and/or value checking indicated.
/Set	set the value of program parameters.
/Print	print Value/Range and/or File/Variable specifications.
/Validate	performs predefined tests which require the presence of certain variable names in each of the required record descriptions. The variables must also be in the required format or results are unpredictable.

Data Types

The program recognizes three data types I, R, C for Integer, Real and Character. Type checking consists of the conversion of the ASCII string into the desired item. Character items may be up to 10 characters long. Real and integer items must be convertable by the PASCAL conversion routines.

Command Format

This section provides detail on the format and parameters of each command.

/List File=u:ffffffff.ext/LST:/CON:

direct listable output to specified file/device. If the same file is specified twice in the same run previously written output will be lost.

/Values

ValName,Type(ValList)
.
.
ValName,Type(ValList)

ValName - a unique name which species this value list. Names of Values and Ranges are kept in the same list, a name consists of up to 10 characters using A-Z,0-9
Type - as defined above one of R I or C.
ValList - a list of values appropriate to the type for example (1,2,3,4) valid for I, R or C, or (1.1,2.2,3.3) valid for R or C, or (A,B,C,D) or ('A','B','C','D') valid for C.

Note that the length of a character type value is determined from the length of the first item in the list. All subsequent items must be of the same length. As illustrated in the last example a string may be enclosed in quotes "'", with this form any character may be included in the string. Most character strings not containing embedded spaces or punctuation will be correctly interpreted using the form (A,B,C,D).

ValName,Type,FROM('ffffffff.ext',LineN,NLines,ColB,NCols)

read a list of values from the designated file,the values are located on LineN of each record of NLines, starts in ColB and is NCols long.

/Range

RangeName,type,(RangePairList)

RangeName - as for ValName
Type - as defined above
RangePairList - as for ValList with the following condition the values must occur in low high pairs.

/Read File= u:ffffffff.ext

begin to read commands from the file named until end of file or until a /Close command is encountered. Note that end of file automatically forces a /Close to be inserted in the command stream. Files can be nested up to 5 deep including the primary file.

/Close

closes the current active command file and reverts to the previous level. It is issued automatically when the program encounters an end of file.

```
/VarList  NAME=RecordName(, LINES=n)
    VarName,(LineNo,),ColB,ColLen,type(Checks=CheckName1(,..5)/
    .
    .
    VarName,(LineNo,),ColB,ColLen,type(Checks=CheckName1(,..5)/
```

NAME= RecordName - Record identifier

LINES= n - number of lines in this record

VarName - Variable identifier unique for this record 1-10 characters in A..Z,0..9

LineNo - optional LineNumber in record will be used if present otherwise the previous line number is used. When initializing a record the default is 1.

ColB - Beginning column location, may be a + if variable starts just after the previously defined variable.

ColLen - Length of the Variable field in characters.

Type - I, R or C as described above. Type R can further be scaled by using Rn where n = power of 10 to divide by. This is useful where numbers are recorded without decimal points imbedded.

Checks= - optional Keyword followed by 1 to 5 value, range or special test names. The variable must pass any one range or value check to be accepted. The special checks are

SpDistance - ensures that the Distance = Speed * TimeDur relationship is correct for SET data. This test requires that the record have the following variables defined DISTANCE as R1, TIMEDUR as R, SPEED as R1.

SpNoMeas - ensures that the numbers reported as measured follow a logical sequence. Requires the following variables of type I on a record for CATCH data. NUMBERSP, LENGTH, SEX, MATURITY, WEIGHT, OTOLITHS, PARASITES, STOMACH.

Note that the special check must occur after all required variables have been defined. See example below.

/ - indicates the end of one variable definition note that variable definitions all start on a separate line and the first starts on the line after the command.

```
/Print    (Values,) (Files)
```

Dump to the listing file a formatted listing of the Values/Ranges and/or Files/Variables specifications.

```
/Test     NAME= RecordName, FILE=u:fffffff.ext
```

NAME= a previously defined record name
FILE= an existing data file.
This command will initialize the reading of a data file and will cause validation testing of each record on a line by line basis. If any errors are found the line will be printed along with error diagnostics.

```
/Validate
     SetCatch,SET=SetRecordName=u:fffffffff.ext,
             CATCH=CatchRecordName=u:fffffffff.ext/
     Lengths,LENGTH=LengthRecordName=u:ffffffff.ext,
             BIO=BioRecordName=u:ffffffff.ext,
             CATCH=CatchRecordName=u:ffffffff.ext/
     Regress,BIO=BioRecordName=u:ffffffff.ext,
             SPECIES=SpeciesRecordName=u:ffffffff.ext/
```

SetCatch
- Set Catch tests the of number species on Set = number species in Catch data. The program also compares the weight reported on the SET card with the sum of the weights reported on the catch cards. Note that the weight on the set card is in 10 kg. units while the catch is reported in kg. A pair of fuzz factors are defined as program constants to allow for legitimate variation. Requires that data be sorted by SET number.

Lengths
- Length measurements consistency test Bio and Length are consistent ie for any length Bio no is less than or equal to Length no and the total = what is recorded in the Catch data. Requires that data be sorted by SET no and SPECIES.

Regress
- perform regression test to validate

Length = a * Age ** b

and

Weight = a * Length ** b

relationships in the Biological data. The program has two predefined fuzz factors called RegFuzzFactor one for length and one for weight. These are set in the constants section which specifies the limits of acceptable variation as a ratio. At time of writing they were set to o.15 (15%) and 0.25 (25%). Measurements for the variables are in cm. for length, age in years and weight is in grams. Both files used in this analysis must be sorted by species.

Each test requires that the records be defined and that the appropriate data files exist. the following are the variable name and type requirements.

SetCatch

Set	SetNo,I	NoFish,I	NoInvert,I	WeightCat,R
Catch	SetNo,I	Species,I	NumberSp,I	WeightSp,R1

```
Lengths
     Bio        SetNo,I  Species,I  RecordNo,I  Length,I
     Length     SetNo,I  Species,I  Grouping,I  StatrtLen,I
                Len1,I (the first of 14 freq. measurements)
     Catch      SetNo,I  Species,I  Length,I

Regress
     Bio     Species,I  Length,R   Age,R     Weight,R
     Species Species,I  a1,R b1,R  a2,R      b2,R
```

ANNOTATED EXAMPLE PROGRAM

```
/VALUES
  VAL1,I(1,2,3,4,5,6)
  VAL2,C(1,2,4,5)
  SPECIES,I,FROM('SPECIES.DBA',1,2,1,4)
```

Three value items are defined here VAL1,VAL2 and SPECIES VAL1 is of type I (integer) and the values associated with this name are 1,2,3,4,5,6
VAL2 is of type Character
SPECIES is of type I and is to be read from the file Species.DBA note that the species name is enclosed in quotation marks. Any string containing a separator character such a . , / ( ) must be in quotation marks for it to be recognized properly.

```
/RANGES
  1to31,I(1,31)
  1to12,I(1,12)
  Years,I(70,85)
  RAN1,I(1,3,5,7,12,15,19)
```

There are four range specifications 1to31 1to12 Years and Ran1. Note that serveral valid ranges may be specified as in Ran1. Note also that Ran1 will generate an error because the values are not all in low high pairs (1-3, 5-7, 12-15, and 19 which has no high value.

```
/VARLIST  NAME=BIODATA
  CRUISE,    2,4,C/
  STATION,   +,2,I/
  SETNO,     +,3,I/
  DATEDAY,   +,2,I,CHECKS=1TO31/
  DATEMON,   +,2,I,CHECKS=1TO12/
  DATEYR,    +,2,I,CHECKS=YEARS/
  ICNAFNAFO,+,3,I/
  EXPERIMENT,+,1,I/
  DEPTHGEAR ,+,3,I/
  TEMPGEAR  ,+,3,I/
  TIMEBEG,   +,3,I/
  BOTTOM,    +,1,I/
  SPECIES,   +,4,I,CHECKS=SPECIES/
```

This defines the record BIODATA. The variable Cruise starts in column 2 and is 4 characters long and is of type

Character. The next variable starts after Cruise indicated by the + for starting column.

The variables *DATEDAY, DATEMON and DATEYR* each have a Check associated with them. The variable SPECIES also has a check associated with it called SPECIES. Item names are kept in separate lists so that duplicate names may occur in a file list, and in the Value/Range list. As seen below names may be duplicated in several files.

```
/VARLIST  NAME=SETDATA, LINES=2
  CRUISE,   2,4,C/
  STATION,  +,2,I/
  SETNO,    +,3,I/
  DATEDAY,  2,6,2,I,CHECKS=1TO31/
  DATEMON,  +,2,I,CHECKS=1TO12/
  DATEYR,   +,2,I,CHECKS=YEARS/
```

This record is defined as having 2 lines. The definition of the items on the second line starts with DATEDAY, if there are three numeric parameters before the type specification then the first is the line number.

```
/PRINT VALUES FILES
```

Print a dump of the Value/Range definitionsas well as the Record/Variable definitions

```
/TEST  NAME=BIODATA, FILE=RVP260B.NEW
```

Test the record BIODATA using data from the system File RVP260B.NEW. Note that the syntax of a file name is different here than what was used in the VALUES specification

```
/Close
```

Mark the end of this file. An End-Of-File will cause an implicit /CLOSE to be issued and this will appear on the listing. Lines appearing after a /CLOSE will be ignored.

SPECIAL TESTS EXAMPLE

```
/VALUES
  SPECIES,I,FROM('SPECIES.DBA',1,2,1,4)
/RANGES
  1to31,I(1,31)
  1to12,I(1,12)
  Years,I(70,85)
/VARLIST  Name=CATDATA
 NUMBERSP,     43,5,I/
 LENGTH,       56,4,I/
 SEX,          +,4,I/
 MATURITY,     +,3,I/
 WEIGHT,       +,3,I/
 OTOLITHS,     +,3,I/
 PARASITES,    +,3,I/
 STOMACH,      +,3,I/
 DUMMY,        +,1,C,checks=spNomeas/
/VARLIST  Name=SETDATA
 TIMEDUR,      24,2,R/
 SPEED,        29,3,R1/
 DISTANCE,     46,2,R1/
 DUMMY,        46,2,C,checks=spDistance/
/Test  Name=Setdata File=b:RVP260S.NEW
/Test  Name=Catdata File=b:RVP260C.NEW
/Close
```

The above example shows that the special test check must be made after the last required variable has been defined. Putting the Checks= on the same line as the definitions for DISTANCE or STOMACH respectively will result in the message that the variable is not defined and the test will be ignored.

VALIDATION TEST EXAMPLE

**** Length and SetCatch test example ****

```
/VarList  Name=BioData
 SETNO,        9,2,I/ { Set No may be 2 or 3 depending on cruise}
 SPECIES,      31,4,I/
 RECORDNO,     35,1,I/
 LENGTH,       40,3,I/
/VARLIST  Name=SETDATA
 SETNO,        9,2,I/ {set no may be 2 or 3 depending on cruise}
 NOFISH,       71,2,I/
 NOINVERTS,    +,2,I/
 WEIGHTCAT,    +,4,R/
/VARLIST  Name=LENDATA
 SETNO,        9,2,I/  {note set no may be 2 or 3 depending on cruise}
 SPECIES,      21,4,I/
 NO_SAMPLED,   +,4,I/
 RECORDNO,     34,1,I/
 GROUPING,     +,1,I/
 STARTLEN,     +,3,I/
 LEN1,         +,3,I/
 LEN2,         +,3,I/
 LEN3,         +,3,I/
 LEN4,         +,3,I/
 LEN5,         +,3,I/
 LEN6,         +,3,I/
 LEN7,         +,3,I/
 LEN8,         +,3,I/
 LEN9,         +,3,I/
 LEN10,        +,3,I/
 LEN11,        +,3,I/
 LEN12,        +,3,I/
 LEN13,        +,3,I/
 LEN14,        +,3,I/
/VARLIST  Name=CATDATA
 SETNO,        9,2,I/ { note set no may be 2 or 3 depending on cruise}
 SPECIES,      39,4,I/
 NUMBERSP,     +,5,I/
 WEIGHTSP,     +,4,R1/
 LENGTH,       56,4,I/
/Print Files
/Validate
  Length,Lengths=Lendata='B:RVP260L.NEW',Catch=CatData='B:RVP260C.NEW',
          Bio=BioData='B:RVP260B.NEW'/
  SetCatch,Set=SetData='b:RVP260S.NEW',Catch=CatData='b:RVP260C.NEW'/
/Close
```

**** regression test example ****

```
/VALUES
  SPECIES,I,FROM('SPECIES.DBA',1,2,1,4)
/RANGES
  1to31,I(1,31)
  1to12,I(1,12)
  Years,I(70,85)
/Read  File=dcspecie.prg
/Read  file=dcbioin.prg
/SET  TESTWEIGHT=YES, TESTAGE=OFF
/Print Files
/Validate
  Regress,Bio=BioData='RVP260B.NEW',species=species='SPECIES.DBA'/
```

this example shows the variable lists being read in from files using the READ command
the SET command is used to select which of the regression tests is to be used - both may be run simultaneously.

contents of the READ files

```
/VARLIST  Name=species, Lines=2
 Species,    1,4,I/
 Divisor,    +,4,I/
 A1,         23,10,R/
 B1,         +,10,R/
 A2,         +,10,R/
 B2,         +,10,R/

/VarList  Name=BioData
 CARD_TYPE,    1,1,I/
 CRUISE,       +,4,C/
 STATION,      +,3,I/
 SET_NO,       +,2,I/ { Set No may be 2 or 3 depending on cruise}
 DATEDAY,      +,2,I/
 DATEMON,      +,2,I/
 DATEYR,       +,2,I/
 ICNAF_NAFO,   +,3,I/
 EXPERIMENT,   +,1,I/
 DEPTH_GEAR,   +,3,I/
 TEMP_GEAR,    +,3,I/
 TIME_BEG,     +,3,I/
 BOTTOM,       +,1,I/
 SPECIES,      +,4,I/  *
 RECORD_NO,    +,1,I/
 FISH_NO,      +,4,I/
 LENGTH,       +,3,R/  *
 SEX,          +,1,I/
 MATURITY,     +,1,I/
 WEIGHT,       +,5,R/  *
 STOMACH_CON,  +,1,I/
 ST_VOLUME,    +,5,I/
 ST_NO_SPEC,   +,2,I/
```

```
ST_PART,      +,2,I/
ST_SP_CODE,   +,4,I/
AGE_MATERIAL,+,1,I/
AGE_ANNULI,   +,2,I/
AGE_EDGE,     +,1,I/
AGE_CHECK,    +,3,I/
AGE,          +,2,R/  *
YEAR_CLASS,   +,2,I/
AGER,         +,1,I/
FREE,         +,2,I/
PARASITE,     +,3,I/
```

note that the variables necessary for the regression analysis have been marked with an * in the BIO file

USAGE NOTES

Regress - special files containing the regression coefficients for subgroups of species may be the best approach for partial analyses.

Processing line display - this display gives the line number of the file being processed. In those tests where more than one file is being accessed the display will flicker back and forth to the various line numbers.

Real number formats - this program should accept most Fortran compatible real number formats with the possible exception of numbers in E format.

Abnormal end of file - some problems may be encountered with the program detecting an end of file while processing a line. In this case the fix is to put an extra blank line at the end of the file in question. The message is FILE 'ffffff.ext' TOO SHORT. This message will also occur where a multiline file is short one line.

Upper Case - All Command input is converted to upper case prior to processing. It is assumed that no lower case values exist in the data.

Processing Speed - The speed at which lines of data are processed does not seem to be very dependant on the number of variables defined per line. In single file tests (eg: TEST command) approximately 400 lines can be processed in one minute. With the multi file tests such as VALIDATE LENGTH the processing speed seems to be about 125 lines per minute on the longest file. Processing speed will be reduced as the number of errors encountered goes up because of the time required to format and produce the error report.

APPENDIX III

Sample program output for data analysis programs.

Output from the program **BIOFREQ:** frequencies by strata of parameters of measured fish.

```
R earch V essel AN alysis   BIOFREQ              pgm ver:3.0  01/07/8
Bio Data Frequency Dist. by Stratum              dat ver:1.20

For Cruise(s)  H172 (1987)
For Species    0012    White Hake
Run by TH                                        Date 10/ 2/89   13:20
                                                 Page   1 of    1
Experiment Type(s) 1,2,3
For sex codes  ALL

For variable MATURITY

Stratum    433          437          438          439          ALL
No. Sets    1            5            1            3            10
CODE     Freq.    %    Freq.    %    Freq.    %    Freq.    %    Freq.    %
   1       1  100.0    26    24.5    2  100.0    14    13.2    43    20.0
   2       0    0.0    20    18.9    0    0.0    13    12.3    33    15.3
   4       0    0.0     7     6.6    0    0.0    34    32.1    41    19.1
   5       0    0.0     0     0.0    0    0.0     3     2.8     3     1.4
   6       0    0.0     0     0.0    0    0.0    21    19.8    21     9.8
   8       0    0.0    53    50.0    0    0.0    21    19.8    74    34.4
TOTAL      1          106            2           106           215

new page...

R earch V essel AN alysis   BIOFREQ              pgm ver:3.0  01/07/8
Bio Data Frequency Dist. by Stratum              dat ver:1.20

For Cruise(s)  H172 (1987)
For Species    0012    White Hake
Run by TH                                        Date 10/ 2/89   13:20
                                                 Page   1 of    2
Experiment Type(s) 1,2,3
For sex codes  ALL

For variable WEIGHT          x 1 Kg

Stratum    433          437          438          439          ALL
No. Sets    1            5            1            3            10
CODE     Freq.    %    Freq.    %    Freq.    %    Freq.    %    Freq.    %
 0.0       1  100.0    16    15.1    1   50.0     0     0.0    18     8.4
 0.1       0    0.0    26    24.5    1   50.0     3     2.8    30    14.0
 0.2       0    0.0     7     6.6    0    0.0     2     1.9     9     4.2
 0.3       0    0.0     8     7.5    0    0.0     0     0.0     8     3.7
 0.4       0    0.0     5     4.7    0    0.0     4     3.8     9     4.2
 0.5       0    0.0     7     6.6    0    0.0     3     2.8    10     4.7
 0.6       0    0.0     3     2.8    0    0.0     2     1.9     5     2.3
 0.7      0     0.0      0    0.0      0    0.0      3    2.8      3    1.4
 0.8      0     0.0      1    0.9      0    0.0      4    3.8      5    2.3
 0.9      0     0.0      3    2.8      0    0.0      6    5.7      9    4.2
 1.0      0     0.0      4    3.8      0    0.0      3    2.8      7    3.3
 .
 . sample file
 .
 6.0      0     0.0      1    0.9      0    0.0      0    0.0      1    0.5
 6.4      0     0.0      1    0.9      0    0.0      0    0.0      1    0.5
 6.9      0     0.0      0    0.0      0    0.0      1    0.9      1    0.5
 7.5      0     0.0      1    0.9      0    0.0      0    0.0      1    0.5
 7.8      0     0.0      1    0.9      0    0.0      0    0.0      1    0.5
 7.9      0     0.0      0    0.0      0    0.0      1    0.9      1    0.5
 8.3      0     0.0      0    0.0      0    0.0      2    1.9      2    0.9
 9.8      0     0.0      0    0.0      0    0.0      1    0.9      1    0.5
10.2      0     0.0      1    0.9      0    0.0      0    0.0      1    0.5
TOTAL     1            106             2           106            215
```

Listing files such as these can be made for maturity, age, length and weight. At the same time, data files of X-Y pairs can be made of length and weight or length and age.

The X-Y for length and weight for white hake cruise H172, all sexes, and experiment types 1,2, and 3 follows:

```
 Cruise H172 Species 0012 Sex Codes *          Experiment 1,2,3
021,00048
068,02100
019,00046
049,01100
023,00070
077,04500
080,04500
067,02500
072,03700
056,01700
062,02200
071,03300
085,07500
029,00040
052,01500
051,01500
088,06000
 .
 . sample file
 .
056,01400
030,00175
024,00100
023,00075
022,00050
018,00025
```

Output from the program **DataLst:** various character based reports.

```
R esearch V essel AN alysis   DATALST         pgm ver:1.11 30/12/88
R E P O R T:Set:Physical Parameters           dat ver:1.20

For Cruise(s)  H172 (1987)

Run by TH                                     Date 10/ 2/89    9:16
                                              Page   1

Experiment Type(s) 1,2,3
For sex codes  ALL

STRAT SET DATE  NAFO EXP GEAR  AUX SPD  OBT  DIST  SRCE TIME TIME DEPTH DEPTH
          DD/MM                                          BEG  DUR        RAN
 403  050 19/05 432   2  WIIA RCLL 035  LOG   16  LORAN 0905  30   031   02
 403  051 19/05 432   2  WIIA RCLL 035  LOG   15  LORAN 1020  30   036   01
 432  054 23/05 433   2  WIIA RCLL 035  LOG   16  LORAN 0959  30   044   03
 432  055 23/05 433   2  WIIA RCLL 035  LOG   18  LORAN 1242  30   030   04
 433  056 19/05 432   2  WIIA RCLL 035  LOG   16  LORAN 1305  30   039   04
 433  057 19/05 432   2  WIIA RCLL 035  LOG   19  LORAN 1435  30   032   00
 433  058 23/05 432   2  WIIA RCLL 035  LOG   14  LORAN 0731  30   021   01
 434  059 22/05 432   2  WIIA RCLL 035  LOG   15  LORAN 1805  30   064   03
 434  060 22/05 432   2  WIIA RCLL 035  LOG   18  LORAN 1457  30   058   03
 434  061 20/05 432   2  WIIA RCLL 035  LOG   15  LORAN 0636  30   053   02
 435  062 22/05 431   2  WIIA RCLL 035  LOG   16  LORAN 1120  30   032   02
 435  063 21/05 431   2  WIIA RCLL 035  LOG   15  LORAN 0745  30   027   02
 436  064 22/05 431   2  WIIA RCLL 035  LOG   16  LORAN 0728  30   058   03
 436  065 20/05 431   2  WIIA RCLL 035  LOG   16  LORAN 1837  30   067   05
 436  066 21/05 431   2  WIIA RCLL 035  LOG   16  LORAN 0919  30   058   05
 437  067 20/05 432   2  WIIA RCLL 035  LOG   16  LORAN 0830  30   107   03
 437  068 20/05 432   2  WIIA RCLL 035  LOG   15  LORAN 1035  30   145   06
 437  069 20/05 431   2  WIIA RCLL 035  LOG   18  LORAN 1253  30   178   07
 438  070 21/05 431   2  WIIA RCLL 035  LOG   15  LORAN 1938  30   107   04
 438  071 21/05 431   2  WIIA RCLL 035  LOG   19  LORAN 1430  30   117   17
 439  072 20/05 431   2  WIIA RCLL 035  LOG   16  LORAN 1615  30   267   22
 439  073 21/05 431   2  WIIA RCLL 035  LOG   18  LORAN 1616  30   314   14
 433  081 19/05 432   2  WIIA RCLL 035  LOG   16  LORAN 1940  30   052   01
 433  082 19/05 432   2  WIIA RCLL 035  LOG   17  LORAN 2118  30   051   01
 434  110 20/05 432   2  WIIA RCLL 035  LOG   18  LORAN 0205  30   067   00
 434  111 20/05 432   2  WIIA RCLL 035  LOG   19  LORAN 0020  30   066   00
 .
 . sample file
 .
 438  135 20/05 431   2  WIIA RCLL 035  LOG   15  LORAN 2258  30   164   05
 436  136 21/05 431   2  WIIA RCLL 035  LOG   19  LORAN 0345  30   059   07
 439  137 20/05 431   2  WIIA RCLL 035  LOG   16  LORAN 2044  30   298   28
 436  138 21/05 431   2  WIIA RCLL 035  LOG   16  LORAN 2117  30   061   02
 437  139 21/05 431   2  WIIA RCLL 035  LOG   15  LORAN 2311  30   175   11
 437  140 22/05 431   2  WIIA RCLL 035  LOG   18  LORAN 0118  30   104   06
 434  141 22/05 432   2  WIIA RCLL 035  LOG   18  LORAN 1630  30   061   01
 433  142 22/05 432   2  WIIA RCLL 035  LOG   16  LORAN 2302  30   034   01
 433  143 23/05 432   2  WIIA RCLL 035  LOG   18  LORAN 0319  30   037   01
 433  158 19/05 432   2  WIIA RCLL 035  LOG   14  LORAN 1704  30   033   01
```

```
                         R esearch  V essel  AN alysis

R esearch V essel AN alysis   DATALST          pgm ver:1.11 30/12/88
R E P O R T:Set:Bio/Environ Parameters         dat ver:1.20

For Cruise(s)  H172 (1987)

Run by TH                                      Date 10/ 2/89    9:16
                                               Page   2
Experiment Type(s) 1,2,3
For sex codes  ALL

SET DATE  TIME LAT  LONG DPTH   WIND   TIDE TMP TMP SAL  BOT  LGHT  INV FISH  CAT
           BEG                 DIR FOR      SUR BOT BOT  TYP        #SP #SP  WGHT
050 19/05 0905 4546 6138  031  W    02 UNWN 051 -13 999 CLAY   999  04  10   0007
051 19/05 1020 4550 6141  036  N    03 UNWN 046 -10 999 CLAY   999  04  10   0025
054 23/05 0959 4557 6232  044  NE   03 UNWN 050 -05 999 SANDC  999  06  12   0023
055 23/05 1242 4555 6302  030  NW   04 UNWN 057 020 999 CLAY   999  04  10   0026
056 19/05 1305 4600 6209  039  W    02 UNWN 048 -07 999 CLAY   999  07  08   0025
057 19/05 1435 4553 6214  032  E   UNK UNWN 045 -08 999 CLAY   999  09  10   0008
058 23/05 0731 4608 6218  021  N    01 UNWN 048 017 999 GRAVL  999  03  10   0326
059 22/05 1805 4634 6114  064  SW   02 UNWN 049 -13 999 SANDF  999  04  08   0436
060 22/05 1457 4635 6142  058  SW   04 UNWN 041 -14 999 SANDC  999  10  09   0014
061 20/05 0636 4657 6120  053  NW   02  BOW 026 -03 999 SANDF  999  06  04   0669
062 22/05 1120 4708 6150  032  SW   04 UNWN 035 -06 999 GRAVL  999  08  07   0304
063 21/05 0745 4747 6109  027  W    03 UNWN 046 028 999 SANDC  999  07  08   0034
064 22/05 0728 4720 6057  058  SW   05 UNWN 043 -01 999 SANDF  999  07  07   0095
065 20/05 1837 4720 6027  067  SW   04 UNWN 035 003 999 SANDF  999  05  06   0059
066 21/05 0919 4747 6057  058  W    03 UNWN 036 -08 999 SANDF  999  02  07   0035
067 20/05 0830 4656 6058  107  N    03 UNWN 035 014 999 CLAY   999  06  07   0253
068 20/05 1035 4659 6044  145  W    03 UNWN 045 034 999 SANDC  999  05  14   1205
069 20/05 1253 4709 6024  178  W    06 UNWN 029 999 999 CLAY   999  04  15   0720
070 21/05 1938 4726 6030  107  SW   03 UNWN 040 015 999 SANDF  999  01  08   0223
071 21/05 1430 4757 6057  117  SW   04 UNWN 041 005 999 SANDF  999  03  06   0084
072 20/05 1615 4718 6011  267  W    07 UNWN 026 999 999 CLAY   999  06  11   0444
073 21/05 1616 4756 6047  314  SW   05 UNWN 037 999 999 CLAY   999  05  09   1172
081 19/05 1940 4607 6144  052  NE   02 STAR 047 -10 999 CLAY   999  04  07   0024
082 19/05 2118 4616 6132  051  N    02 PORT 047 -14 999 CLAY   999  07  11   0058
110 20/05 0205 4643 6139  067  W    04 UNWN 026 -05 999 SANDC  999  06  09   0216
111 20/05 0020 4644 6127  066  NW   04 UNWN 028 999 999 SANDF  999  09  08   0615
112 22/05 2115 4620 6149  045  SW   02 UNWN 051 -14 999 SANDF  999  06  06   0130
113 23/05 0100 4607 6159  038  N    04 UNWN 052 -02 999 GRAVL  999  10  10   0039
130 20/05 0436 4701 6133  035  W    04 UNWN 028 -04 999 GRAVL  999  08  07   0248
131 22/05 0309 4705 6111  051  S    06 UNWN 038 -12 999 SANDF  999  09  06   0173
132 22/05 0513 4717 6124  034  SW   05 UNWN 027 001 999 SANDF  999  05  08   0221
134 21/05 0556 4737 6103  034  W    02 UNWN 034 020 999 SANDC  999  04  07   0090
135 20/05 2258 4741 6034  164  SW   04 UNWN 034 999 999 CLAY   999  03  10   0176
136 21/05 0345 4736 6043  059  SW   05 UNWN 034 -07 999 SANDF  999  06  09   0119
137 20/05 2044 4730 6024  298  SW   04 UNWN 035 999 999 CLAY   999  01  07   0111
138 21/05 2117 4720 6039  061  SW   03 UNWN 044 -03 999 SANDF  999  05  05   0034
139 21/05 2311 4709 6038  175  SW   05 UNWN 040 999 999 SANDF  999  11  14   0215
140 22/05 0118 4704 6055  104  S    07 UNWN 032 014 999 CLAY   999  06  13   0277
141 22/05 1630 4631 6127  061  S    04 UNWN 052 -09 999 SANDF  999  07  10   0533
142 22/05 2302 4619 6208  034  W    03 UNWN 050 013 999 CLAY   999  07  08   0101
143 23/05 0319 4601 6208  037  NW   04 UNWN 054 -13 999 CLAY   999  06  11   0025
158 19/05 1704 4609 6210  033  N    05 UNWN 042 -14 999 GRAVL  999  09  11   0056
```

R esearch V essel AN alysis

The following is a sample of the general catch report, ie. includes all species.

```
R esearch V essel AN alysis   DATALST          pgm ver:1.11 30/12/88
R E P O R T:Catch                              dat ver:1.20

For Cruise(s)  H172 (1987)
Con't from Species    9999    UNKNOWN
Run by TH                                      Date 10/ 2/89   10: 0
                                               Page    1

Experiment Type(s) 1,2,3
For sex codes  ALL

STRA SET DATE  SPECIES  EXP NUM   WEIGHT BASK LEN  SEX  MAT WEIGHT OTOL PRSTS STOM
         DD/MM              SP    SP     SP
 403 050 19/05 COD - A   2 00001 0001   00.1 0001 0001 001  001   001   000   000
 403 050 19/05     PLA   2 00005 00.5   00.1 0005 0005 004  004   000   000   000
 403 050 19/05     FLW   2 00003 00.5   00.1 0003 0003 003  003   000   000   000
 403 050 19/05     HER   2 00023 0001   00.1 0023 0006 000  006   000   000   000
 403 050 19/05     CAP   2 00002 00.1   00.1 0002 0001 000  001   000   000   000
 403 050 19/05   BRILL   2 00003 0.01   00.1 0003 0000 003  003   000   000   000
 403 050 19/05   W-SKA   2 00001 0002   00.1 0001 0001 000  001   000   000   000
 403 050 19/05   L-SCU   2 00001 00.5   00.1 0001 0000 000  001   000   000   000
 403 050 19/05 LUMPFIS   2 00001 0001   00.1 0001 0000 000  001   000   000   000
 403 050 19/05 SNAKEBL   2 00001 00.1   00.1 0001 0000 000  001   000   000   000
 403 050 19/05 SNO-CRA   2 00001 00.1   00.1 0000 0000 000  000   000   000   000
 403 050 19/05     LBA   2 00006 0002   00.1 0000 0000 000  000   000   000   000
 403 050 19/05 STARFIS   2 00014 0001   00.1 0000 0000 000  000   000   000   000
 403 050 19/05 UNKNOWN   2 00000 0002   00.1 0000 0000 000  000   000   000   000

 403 051 19/05 COD - A   2 00011 0011   00.5 0011 0008 008  008   000   000   000
 403 051 19/05     PLA   2 00042 0006   00.2 0042 0042 024  024   000   000   000
 403 051 19/05     YEL   2 00002 0001   00.1 0002 0002 002  002   000   000   000
 403 051 19/05     FLW   2 00004 0001   00.1 0004 0004 002  002   000   000   000
 403 051 19/05     HER   2 00007 0001   00.1 0007 0004 001  004   000   000   000
 403 051 19/05     CAP   2 00016 0001   00.1 0016 0004 004  004   000   000   000
 403 051 19/05   BRILL   2 00003 00.1   00.1 0003 0002 003  003   000   000   000
 403 051 19/05   W-SKA   2 00001 0002   00.1 0001 0001 000  001   000   000   000
 403 051 19/05   L-SCU   2 00003 0001   00.1 0003 0002 001  002   000   000   000
 403 051 19/05  O-POUT   2 00002 0001   00.1 0002 0002 000  002   000   000   000
 403 051 19/05 SNO-CRA   2 00077 0010   00.8 0000 0000 000  000   000   000   000
 403 051 19/05     LBA   2 00001 0001   00.1 0000 0000 000  000   000   000   000
 403 051 19/05 SEA MOU   2 00002 00.1   00.1 0000 0000 000  000   000   000   000
 403 051 19/05 BRITTLE   2 00000 06.0   00.5 0000 0000 000  000   000   000   000

 .
 . sample file
 .
 433 143 23/05     FLW   2 00006 0003   00.1 0006 0006 006  006   000   000   000
 433 143 23/05 4 B RCK   2 00001 0.75   00.1 0001 0001 001  001   000   000   000
 433 143 23/05   BRILL   2 00004 .530   00.1 0004 0004 004  003   000   000   000
 433 143 23/05   W-SKA   2 00004 0002   00.1 0004 0004 000  004   000   000   000
 433 143 23/05   L-SCU   2 00005 0001   00.1 0005 0005 005  005   000   000   000
 433 143 23/05 SEA RAV   2 00002 0002   00.1 0002 0002 000  002   000   000   000
 433 143 23/05 SNAKEBL   2 00003 .145   00.1 0003 0003 003  003   000   000   000
 433 143 23/05  O-POUT  2 00006 0003   00.1 0006 0005 005   005    000    000    000
 433 143 23/05     CRK  2 00002 0.15   00.1 0000 0000 000   000    000    000    000
 433 143 23/05  T-CRAB  2 00005 0.47   00.1 0000 0000 000   000    000    000    000
 433 143 23/05     LBA  2 00007 0004   00.2 0000 0000 000   000    000    000    000
 433 143 23/05 SEA MOU  2 00080 0002   00.1 0000 0000 000   000    000    000    000
 433 143 23/05 ECHINOD  2 00000 0008   00.4 0000 0000 000   000    000    000    000
 433 143 23/05 SUNSTAR  2 00027 0002   00.1 0000 0000 000   000    000    000    000

 433 158 19/05 COD - A  2 00044 0040   01.3 0044 0020 020   020    002    000    000
 433 158 19/05     PLA  2 00026 0005   00.2 0026 0026 016   016    000    000    000
 433 158 19/05     YEL  2 00002 0001   00.1 0002 0002 002   002    000    000    000
 433 158 19/05     FLW  2 00016 0003   00.1 0016 0016 012   012    000    000    000
 433 158 19/05     HER  2 00001 0.01   00.1 0001 0001 000   001    000    000    000
 433 158 19/05     CAP  2 00003 0.03   00.1 0003 0003 000   003    000    000    000
 433 158 19/05   W-SKA  2 00005 03.5   00.1 0005 0005 000   005    000    000    000
 433 158 19/05   L-SCU  2 00007 01.5   00.1 0007 0005 000   005    000    000    000
 433 158 19/05 SEA RAV  2 00001 0001   00.1 0001 0001 000   001    000    000    000
 433 158 19/05 ALLIGAT  2 00002 .005   00.1 0002 0000 000   002    000    000    000
 433 158 19/05  O-POUT  2 00002 0001   00.1 0002 0002 000   002    000    000    000
 433 158 19/05     CRK  2 00005 0001   00.1 0000 0000 000   000    000    000    000
 433 158 19/05  T-CRAB  2 00008 0001   00.1 0000 0000 000   000    000    000    000
 433 158 19/05     LBA  2 00039 0014   0001 0000 0000 000   000    000    000    000
 433 158 19/05 SEA MOU  2 00002 00.1   00.1 0000 0000 000   000    000    000    000
 433 158 19/05 EGG-BUC  2 00002 00.1   00.1 0000 0000 000   000    000    000    000

next page ...

R esearch V essel AN alysis    DATALST          pgm ver:1.11 30/12/88
R E P O R T:Catch                               dat ver:1.20

For Cruise(s)  H172 (1987)
Con't from Species    4211    EGG-BUC
Run by TH                                       Date 10/ 2/89    10: 0
                                                Page  24
Experiment Type(s) 1,2,3
For sex codes  ALL

STRA SET DATE  SPECIES EXP NUM WEIGHT BASK LEN  SEX  MAT WEIGHT OTOL PRSTS STOM
         DD/MM              SP    SP    SP
 433 158 19/05 SUNSTAR  2 00020 0003   00.2 0000 0000 000   000    000    000    000
 433 158 19/05     URC  2 00018 00.1   00.1 0000 0000 000   000    000    000    000
 433 158 19/05 SEA CUC  2 00002 00.5   00.1 0000 0000 000   000    000    000    000
 433 158 19/05 ALGAE/S  2 00000 0002   00.2 0000 0000 000   000    000    000    000
```

The following is a subset catch report for American plaice only.

```
R esearch V essel AN alysis   DATALST          pgm ver:1.11 30/12/88
R E P O R T:Catch                               dat ver:1.20

For Cruise(s)  H172 (1987)
Subset for Species    0040   American Plaice
Run by TH                                       Date 10/ 2/89    9:40
                                                Page   1
Experiment Type(s) 1,2,3
For sex codes  ALL

STRA SET DATE  SPECIES EXP NUM WEIGHT BASK LEN  SEX  MAT WEIGHT OTOL PRSTS STOM
         DD/MM              SP    SP    SP


 403 050 19/05     PLA  2 00005 00.5  00.1 0005 0005 004  004   000   000   000
 403 051 19/05     PLA  2 00042 0006  00.2 0042 0042 024  024   000   000   000

 432 054 19/05     PLA  2 00004 0001  00.1 0004 0004 003  003   000   000   000
 432 055 19/05     PLA  2 00006 0001  00.1 0006 0006 006  006   000   000   000

 433 056 19/05     PLA  2 00016 0002  00.1 0016 0016 014  014   000   000   000
 433 057 19/05     PLA  2 00011 0002  00.1 0011 0011 008  008   000   000   000
 433 058 19/05     PLA  2 00022 0003  00.1 0022 0022 014  014   000   000   000
 .
 . sample file
 .

 436 136 19/05     PLA  2 00060 0020  00.6 0060 0060 036  036   000   000   000
 436 138 19/05     PLA  2 00037 0016  00.5 0037 0037 023  023   000   000   000

 437 139 19/05     PLA  2 00008 0001  00.1 0008 0008 007  007   000   000   000

next page ...

R esearch V essel AN alysis   DATALST          pgm ver:1.11 30/12/88
R E P O R T:Catch                               dat ver:1.20

For Cruise(s)  H172 (1987)
Subset for Species    0040   American Plaice
Run by TH                                       Date 10/ 2/89    9:40
                                                Page   2
Experiment Type(s) 1,2,3
For sex codes  ALL

STRA SET DATE  SPECIES EXP NUM WEIGHT BASK LEN  SEX  MAT WEIGHT OTOL PRSTS STOM
         DD/MM              SP    SP    SP
 437 140 19/05     PLA  2 00196 0038  01.0 0196 0196 054  054   000   000   000

 433 142 19/05     PLA  2 00387 0034  01.2 0262 0262 046  046   000   000   000
 433 143 19/05     PLA  2 00055 0006  00.2 0055 0055 032  032   000   000   000
 433 158 19/05     PLA  2 00026 0005  00.2 0026 0026 016  016   000   000   000
```

The following is a sample of the subset length report, ie. includes only winter skate.

```
R esearch V essel AN alysis   DATALST         pgm ver:1.11 30/12/88
R E P O R T:Length                            dat ver:1.20

For Cruise(s)  H172 (1987)
Subset for Species    0204   Winter Skate
Run by TH                                     Date 10/ 2/89   10:48
                                              Page   1
Experiment Type(s) 1,2,3
For sex codes  ALL

STRAT SET  DATE  SPECIES  SEX  START GROUP  INT  RATIO  NO.   #in LF   #Caught
           DD/MM                LEN                     SAMP  on Rec   on Rec
 403  050  19/05  W-SKA    M    050    1     1   1.00  0001     1        1.00
    ------------------------------------------------------------------------
                               TOTAL                            1        1.00

 403  051  19/05  W-SKA    F    050    1     1   1.00  0001     1        1.00
    ------------------------------------------------------------------------
                               TOTAL                            1        1.00

 432  055  19/05  W-SKA    F    040    1     1   1.00  0001     1        1.00
    ------------------------------------------------------------------------
                               TOTAL                            1        1.00

 433  057  19/05  W-SKA    M    020    1     1   1.00  0001     1        1.00
    ------------------------------------------------------------------------
                               TOTAL                            1        1.00

 433  058  19/05  W-SKA    M    020    1     1   1.00  0003     1        1.00
 433  058  19/05  W-SKA    M    030    1     1   1.00  0003     1        1.00
 433  058  19/05  W-SKA    M    050    1     1   1.00  0003     1        1.00
 433  058  19/05  W-SKA    F    050    1     1   1.00  0001     1        1.00
    ------------------------------------------------------------------------
                               TOTAL                            4        4.00

 434  059  19/05  W-SKA    F    040    1     1   1.00  0001     1        1.00
    ------------------------------------------------------------------------
                               TOTAL                            1        1.00

 434  060  19/05  W-SKA    C    030    1     1   1.00  0007     4        4.00
 434  060  19/05  W-SKA    C    040    1     1   1.00  0007     2        2.00
 434  060  19/05  W-SKA    C    050    1     1   1.00  0007     1        1.00
    ------------------------------------------------------------------------
                               TOTAL                            7        7.00
 .
 . sample file
 .
 433  158  19/05  W-SKA    M    030    1     1   1.00  0001     1        1.00
 433  158  19/05  W-SKA    F    040    1     1   1.00  0004     4        4.00
    ------------------------------------------------------------------------
                               TOTAL                            5        5.00
```

The following is a sample of the detailed biological report, ie. includes all details of one species, Atlantic sea raven.

```
R esearch V essel AN alysis   DATALST         pgm ver:1.11 30/12/88
R E P O R T:Biological--DETAILED              dat ver:1.20

For Cruise(s)  H172 (1987)
Subset for Species    0320   Atlantic Sea Raven
Run by TH                                     Date 10/ 2/89   11:45
                                              Page   2

Experiment Type(s) 1,2,3
For sex codes  ALL

STRAT  SET  DATE   SPECIES  NUMBER  LENGTH  WEIGHT  SEX MAT AGE  YEAR  DFN
 432   054  23/05  SEA RAV   0000    041    01650    F  NO  99    00    N
 432   054  23/05  SEA RAV   0000    036    00850    F  NO  99    00    N
 432   054  23/05  SEA RAV   0000    030    00700    M  NO  99    00    N
 432   054  23/05  SEA RAV   0000    032    00700    M  NO  99    00    N


 433   058  23/05  SEA RAV   0000    028    00700    F  NO  99    00    N
 433   058  23/05  SEA RAV   0000    026    00500    F  NO  99    00    N

 434   059  22/05  SEA RAV   0000    028    00450    F  NO  99    00    N

 434   060  22/05  SEA RAV   0000    033    00800    F  NO  99    00    N

 434   061  20/05  SEA RAV   0000    030    01000    F  NO  99    00    N
 434   061  20/05  SEA RAV   0000    038    01350    F  NO  99    00    N
 434   061  20/05  SEA RAV   0000    043    01200    M  NO  99    00    N
 434   061  20/05  SEA RAV   0000    034    01250    F  NO  99    00    N


 435   062  22/05  SEA RAV   0000    032    00470    M  NR  99    00    N
 435   062  22/05  SEA RAV   0000    041    01200    M  R   99    00    N

 435   063  21/05  SEA RAV   0000    031    00580    F  R   99    00    N


 436   064  22/05  SEA RAV   0000    037    00900    M  NO  99    00    N
 436   064  22/05  SEA RAV   0000    038    01150    F  NO  99    00    N

 436   066  21/05  SEA RAV   0000    039    01700    F  R   99    00    N
  .
  . sample file
  .

 434   141  22/05  SEA RAV   0000    036    01000    F  NO  99    00    N
 434   141  22/05  SEA RAV   0000    039    01400    F  NO  99    00    N

 433   143  23/05  SEA RAV   0000    031    00700    M  NO  99    00    N
 433   143  23/05  SEA RAV   0000    034    01000    F  NO  99    00    N

 433   158  19/05  SEA RAV   0000    028    00530    M  NO  99    00    N
```

R esearch V essel AN alysis

The following is a sample of the summary biological report, ie. includes a 'table of contents' of one species.

```
R esearch V essel AN alysis   DATALST        pgm ver:1.11 30/12/88
R E P O R T:Biological--SUMMARY              dat ver:1.20

For Cruise(s)  H172 (1987)
Subset for Species    0501   Lumpfish
Run by TH                                    Date 10/ 2/89   11:54
                                             Page    1
Experiment Type(s) 1,2,3
For sex codes  ALL


            STRAT     SET    DATE                SPECIES    #OBSERVED

             403      050    19/05              LUMPFISH          1

             432      054    23/05              LUMPFISH          1

             435      063    21/05              LUMPFISH          3

             436      064    22/05              LUMPFISH          1
             436      065    20/05              LUMPFISH          2
             436      066    21/05              LUMPFISH          2

             437      068    20/05              LUMPFISH          1

             438      071    21/05              LUMPFISH          2

             433      081    19/05              LUMPFISH          1

             435      134    21/05              LUMPFISH          1
```

DataLst can also produce a file of set by set location coordinates (longitude and latitude) and the number of fish in a length range of a species. This file is for use with the program AtlMap and follows the format below.

```
N073  White Hake    Length = 5 to 30cm
nos
-61.63333  45.73333        0.0
-61.68333  45.83333        0.0
-62.16667  46.00000        0.0
-62.25000  45.86667        0.0
-61.26667  46.53333        1.0
-61.68333  46.60000        0.0
-61.28333  46.93333        0.0
-60.95000  46.95000        4.0
-60.76667  46.96667       75.0
-60.40000  47.13333        6.0
-60.51667  47.51667        0.0
-60.23333  47.28333        7.0
-61.70000  46.13333        0.0
-61.53333  46.28333        2.0
-61.45000  46.73333        0.0
-61.85000  46.31667        0.0
-61.98333  46.11667        0.0
-60.60000  47.68333        0.0
-60.68333  47.63333        0.0
-60.36667  47.53333       18.0
```

Note the longitudes are negative as the convention states Longitudes west of Greenwich and Latitudes south of the equator are negative. All coordinates are in decimals of degrees, ie. 0.50 degrees is 30 minutes.

Output from the program **CatStat:** abundance index for a year with individual strata estimates.

```
R esearch V essel AN alysis  CATSTAT       pgm ver:2.41 26 may 1988
Abundance Estimates / Numbers & Weight     dat ver:1.20

For Cruise(s)  H172 (1987)
For Species 0012    White Hake
Run by TH                                           Date 10/ 2/89  13:52
                                                    Page   1
Experiment Type(s)  1 2
Transformation options  Weight = None               Numbers = None

 Strat   Set     #    Weight...of....Fish          Number...of....Fish
                Sets  Abs     Std    Stratum        Abs     Std     Stratum
  403    050            0     0.0          0          0     0.0           0
         051            0     0.0          0          0     0.0           0
         mean    2      0     0.0          0          0     0.0           0
         SD             0     0.0          0          0     0.0           0

  432    054            0     0.0          0          0     0.0           0
         055            0     0.0          0          0     0.0           0
         mean    2      0     0.0          0          0     0.0           0
         SD             0     0.0          0          0     0.0           0

  433    056            0     0.0          0          0     0.0           0
         057            0     0.0          0          0     0.0           0
         058            0     0.1      12589          1     1.3      125892
         081            0     0.0          0          0     0.0           0
         082            0     0.0          0          0     0.0           0
         112            0     0.0          0          0     0.0           0
         113            0     0.0          0          0     0.0           0
         142            0     0.0          0          0     0.0           0
         143            0     0.0          0          0     0.0           0
         158            0     0.0          0          0     0.0           0
         mean   10      0     0.0       1259          0     0.1       12589
         SD             0     0.0       3981          0     0.4       39811
.
. sample file
.
  435    062            0     0.0          0          0     0.0           0
         063            0     0.0          0          0     0.0           0
         130            0     0.0          0          0     0.0           0
         132            0     0.0          0          0     0.0           0
         134            0     0.0          0          0     0.0           0
         mean    5      0     0.0          0          0     0.0           0
         SD             0     0.0          0          0     0.0           0

  436    064            0     0.0          0          0     0.0           0
         065            0     0.0          0          0     0.0           0
         066            0     0.0          0          0     0.0           0
         136            0     0.0          0          0     0.0           0
         138            0     0.0          0          0     0.0           0
         mean    5      0     0.0          0          0     0.0           0
         SD             0     0.0          0          0     0.0           0
```

```
R esearch V essel AN alysis  CATSTAT        pgm ver:2.41 26 may 1988
Abundance Estimates / Numbers & Weight      dat ver:1.20

For Cruise(s)  H172 (1987)
For Species 0012    White Hake
Run by TH
                                                Date 10/ 2/89  13:52
                                                Page    2
Experiment Type(s)  1 2
Transformation options  Weight = None           Numbers = None


 Strat   Set     #    Weight...of....Fish          Number...of....Fish
               Sets   Abs     Std    Stratum        Abs     Std     Stratum

  437    067            3     3.3     137695          2     2.2       91796
         068           41    47.8    2007283         15    17.5      734372
         069          208   202.2    8486076        374   363.6    15258618
         139           86   100.3    4210399       1133  1321.8    55469565
         140            4     3.9     163194          7     6.8      285589
         mean     5    68    71.5    3000930        306   342.4    14367988
         SD            85    83.2    3492415        489   568.7    23864890

  438    070            0     0.0          0          0     0.0           0
         071            0     0.0          0          0     0.0           0
         135            1     0.6       8308          2     2.3       33232
         mean     3     0     0.2       2769          1     0.8       11077
         SD             0     0.3       4797          1     1.3       19187

  439    072          216   236.3    7070000        112   122.5     3665926
         073          414   402.5   12045184        257   249.9     7477325
         137           53    58.0    1734768         29    31.7      949213
         mean     3   228   232.2    6949984        133   134.7     4030821
         SD           181   172.3    5156256        115   109.6     3279317

 TOTAL
   No. Sets    42 Tot Cat  1026     9954942 Tot Cat     1932    18422476
  Total SD                  266     8657448              606    27203205
No. Strata      9 Avg/Set(w) 25.1( 21.6)    Avg/Set(w)   50.5( 40.0)
Miss.strata    17 :70.02% area     33202098 <corrected>          61443337


Notes:   Tot Cat  1026 is the total number of individuals of that
                       species caught under the requested conditions
                       of the above output.
         Avg/Set(w) 25.1( 21.6) is the mean number of individuals
                       caught per tow, the round brackets give
                       the same estimate weighted by stratum area.
         Miss.Strata  17 :70.02% this lists the number of strata
                       not surveyed from the list in the file
                       STRATA.DAT, corrected estimates of the
                       survey population are given assuming the
                       unsurveyed area comprises the same
                       population as the surveyed area.
```

Output from the program **MALKey2:** catch at age of sampled fish, survey catch, and total Gulf population estimates. Included in these tables are the mean length and weights for fish in each table.

```
R esearch V essel AN alysis    MALKEY2          Pgm ver:3.6    08/06/89
Age/Maturity  Length Key Statistics             Dat ver:1.01

                                                Page    1 of   3
Key Run by JM                                   Date  1/ 1/80    8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                               Date  1/ 1/80    8:55
Length data from Cruise P188 (1977)             Avg wt and len from mean
                                                of fish sampled for age
Experiment type : [Key] 1,2                     [L.Freq.] 1
For Species     0012  White Hake
For sex codes   ALL
For variable LENGTH                    Absolute Frequencies

Age         01     02     03     04     05     06     07     08     09
LENGTH    Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.
 013        0      1      0      0      0      0      0      0      0
 022        1      1      0      0      0      0      0      0      0
 025        1      1      0      0      0      0      0      0      0
 028        0      2      1      0      0      0      0      0      0
 031        0      4      0      0      0      0      0      0      0
 034        0      4     13      1      0      0      0      0      0
 037        0      3      9      6      0      0      0      0      0
 040        0      1     12      7      1      0      0      0      0
 043        0      0      5     17      0      0      0      0      0
 046        0      0      3     18      4      1      0      0      0
 049        0      0      0      7      5      0      0      0      0
 052        0      0      1      8      4      2      1      0      0
 055        0      0      2      2      3      3      1      0      0
 058        0      0      0      1      8      0      4      0      0
 061        0      0      1      0      0      2      0      1      0
 064        0      0      0      0      1      3      3      1      0
 067        0      0      0      0      1      0      0      0      1
 070        0      0      0      0      1      0      0      0      0
 073        0      0      0      0      0      1      1      1      1
 088        0      0      0      0      0      0      0      0      0
 091        0      0      0      0      0      0      0      0      1
 103        0      0      0      0      0      0      0      0      0

TOTAL        2     17     47     67     28     12     10      3      3
Avg Len   22.5   31.2   39.8   45.0   54.0   58.8   60.2   66.7   77.0
Avg wt g    88    267    511    730   1288   1648   1685   2467   4333
% Sex M  100.0   47.1   48.9   46.3   32.1   50.0   70.0  100.0   66.7
```

Notes: TOTAL is the actual number of fish assessed for age.
Avg Len is the average length of fish aged at that age.
Avg wt g is the average weight of the fish aged at that age.
% Sex M is the % males of the fish aged at that age.

```
R esearch V essel AN alysis    MALKEY2       Pgm ver:3.6   08/06/89
Age/Maturity  Length Key Statistics          Dat ver:1.01

                                             Page   2 of   3
Key Run by JM                                Date  1/ 1/80   8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                            Date  1/ 1/80   8:55
Length data from Cruise P188 (1977)          Avg wt and len from mean
                                             of fish sampled for age
Experiment type : [Key] 1,2                  [L.Freq.] 1
For Species    0012  White Hake
For sex codes  ALL
For variable LENGTH                Absolute Frequencies

Age         10     11     12     14     ALL
LENGTH     Freq.  Freq.  Freq.  Freq.  Freq.
 013        0      0      0      0      1
 022        0      0      0      0      2
 025        0      0      0      0      2
 028        0      0      0      0      3
 031        0      0      0      0      4
 034        0      0      0      0     18
 037        0      0      0      0     18
 040        0      0      0      0     21
 043        0      0      0      0     22
 046        0      0      0      0     26
 049        0      0      0      0     12
 052        0      0      0      0     16
 055        0      0      0      0     11
 058        0      0      0      0     13
 061        0      0      0      0      4
 064        1      0      0      0      9
 067        0      0      0      1      3
 070        0      0      1      0      2
 073        0      0      0      0      4
 088        0      0      1      0      1
 091        0      0      0      0      1
 103        0      1      0      0      1

TOTAL          1      1      2      1    194
Avg Len     64.0  102.0   80.0   66.0   46.9
Avg wt g    1800   9800   4500   2000   1001
% Sex M      0.0    0.0  100.0  100.0   48.5

Notes: Absolute Frequencies refers to the actual fish that were
                           aged of the fish caught on the cruise.
```

```
R esearch V essel AN alysis    MALKEY2        Pgm ver:3.6    08/06/89
Age/Maturity  Length Key Statistics           Dat ver:1.01

                                              Page    3 of    3
Key Run by JM                                 Date   1/ 1/80    8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                             Date   1/ 1/80    8:55
For variable LENGTH                     Absolute Frequencies


LENGTH      No.   Total in   Total in      Avg      Avg    Sex
           Aged   Len Freq      Area       Age      Wt g   M %
 013          1        1       14531       2.0        0      0
 022          2        2       36608       1.5       88    100
 025          2        2       33702       1.5      110     50
 028          3        3       57091       2.3      208     66
 031          4        5      110069       2.0      225     50
 034         18       38      795630       2.8      301     33
 037         18       37      965884       3.2      390     50
 040         21       34     1105387       3.4      505     57
 043         22       29      914827       3.8      602     64
 046         26       25      680685       4.1      762     38
 049         12       12      361263       4.4      879     58
 052         16       14      440836       4.6     1095     31
 055         11        7      194675       4.9     1300     36
 058         13       13      552635       5.5     1506     46
 061          4        4      122888       5.8     1700    100
 064          9        9      242421       6.9     2050     44
 067          3        4      135162       9.3     2267     66
 070          2        3      100623       8.5     2750     50
 073          4        4      104495       7.5     3125     50
 088          1        2       53736      12.0     6000     99
 091          1        1       30848       9.0     7300      0
 103          1        1       30848      11.0     9800      0
           ----    -----    --------
Total       194      250     7084842       4.3     1001     48
```

Notes: Avg Wt g   is the mean weight of the aged fish at that length.

on the next page
TOTAL Length Frequencies refers to the fish caught on the survey and measured for length.

R esearch V essel AN alysis

```
R esearch V essel AN alysis    MALKEY2         Pgm ver:3.6    08/06/89
Age/Maturity  Length Key Statistics            Dat ver:1.01

                                               Page    1 of    3
Key Run by JM                                  Date  1/ 1/80    8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                              Date  1/ 1/80    8:55
Length data from Cruise P188 (1977)            L/W coeff a: 0.005486
                                                         b: 3.087907
Experiment type : [Key] 1,2                    [L.Freq.] 1
For Species    0012  White Hake                Avg wt and len from mean
For sex codes  ALL                             of fish in this key.
For variable LENGTH          TOTAL  Length Frequencies

Age        01     02     03     04     05     06     07     08     09
LENGTH    Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.
 013       0      1      0      0      0      0      0      0      0
 022       1      1      0      0      0      0      0      0      0
 025       1      1      0      0      0      0      0      0      0
 028       0      2      1      0      0      0      0      0      0
 031       0      5      0      0      0      0      0      0      0
 034       0      8     27      2      0      0      0      0      0
 037       0      6     18     12      0      0      0      0      0
  .
  .    sample file
  .
       new page

R esearch V essel AN alysis    MALKEY2         Pgm ver:3.6    08/06/89
Age/Maturity  Length Key Statistics            Dat ver:1.01

                                               Page    3 of    3
Key Run by JM                                  Date  1/ 1/80    8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                              Date  1/ 1/80    8:55
For variable LENGTH          TOTAL  Length Frequencies


LENGTH     No.   Total in    Total in     Avg     Avg    Sex
          Aged   Len Freq      Area       Age     Wt g   M %
 013        1       1         14531       2.0       15    0
 022        2       2         36608       1.5       77  100
 025        2       2         33702       1.5      114   50
  .
  .    sample file
  .
 070        2       3        100623       8.5     2734   50
 073        4       4        104495       7.5     3112   50
 088        1       2         53736      12.0     5542   99
 091        1       1         30848       9.0     6146    0
 103        1       1         30848      11.0     9010    0
          ----   -----     --------
Total     194     250       7084842       4.3      870   48
```

```
R esearch V essel AN alysis    MALKEY2        Pgm ver:3.6   08/06/89
Age/Maturity  Length Key Statistics           Dat ver:1.01

                                              Page    1 of   3
Key Run by JM                                 Date   1/ 1/80   8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                             Date   1/ 1/80   8:55
Length data from Cruise P188 (1977)           L/W coeff a: 0.005486
                                                        b: 3.087907
Experiment type : [Key] 1,2                   [L.Freq.] 1
For Species     0012  White Hake              Avg wt and len from mean
For sex codes  ALL                            of fish in this key.
For variable LENGTH        TOTAL  Gulf Population  (*1000)

Age         01     02     03     04     05     06     07     08     09
LENGTH    Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.  Freq.
 013        0     15      0      0      0      0      0      0      0
 022       18     18      0      0      0      0      0      0      0
 025       17     17      0      0      0      0      0      0      0
 028        0     38     19      0      0      0      0      0      0
 031        0    110      0      0      0      0      0      0      0
 034        0    177    575     44      0      0      0      0      0
 037        0    161    483    322      0      0      0      0      0
 040        0     53    632    368     53      0      0      0      0
 043        0      0    208    707      0      0      0      0      0
 046        0      0     79    471    105     26      0      0      0
 049        0      0      0    211    151      0      0      0      0
 052        0      0     28    220    110     55     28      0      0
 055        0      0     35     35     53     53     18      0      0
 058        0      0      0     43    340      0    170      0      0
 061        0      0     31      0      0     61      0     31      0
 064        0      0      0      0     27     81     81     27      0
 067        0      0      0      0     45      0      0      0     45
 070        0      0      0      0     50      0      0      0      0
 073        0      0      0      0      0     26     26     26     26
 088        0      0      0      0      0      0      0      0      0
 091        0      0      0      0      0      0      0      0     31
 103        0      0      0      0      0      0      0      0      0

TOTAL      35    588   2088   2422    934    303    322     84    102
No Aged     2     17     47     67     28     12     10      3      3
Avg Len  23.4   33.3   38.8   43.9   54.6   58.8   60.0   65.7   75.8
Avg wt g   94    294    469    677   1340   1676   1744   2292   3710
Bio  t      3    173    979   1639   1251    507    562    192    378
% Sex M 100.0   47.1   48.9   46.3   32.1   50.0   70.0  100.0   66.7

Notes: TOTAL    is the number in thousands estimated to be
                present in the survey area.
       Avg Len  is the mean length at age estimated from the
                length weight regression (a & b listed in header).
       Bio t    is the biomass at age in tonnes.
       TOTAL Gulf Population  estimated numbers of fish in
                thousands in the survey area.
```

```
R esearch V essel AN alysis    MALKEY2          Pgm ver:3.6   08/06/89
Age/Maturity  Length Key Statistics             Dat ver:1.01

                                                Page   2 of   3
Key Run by JM                                   Date  1/ 1/80   8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                               Date  1/ 1/80   8:55
Length data from Cruise P188 (1977)             L/W coeff a: 0.005486
                                                         b: 3.087907
Experiment type : [Key] 1,2                     [L.Freq.] 1
For Species     0012  White Hake                Avg wt and len from mean
For sex codes  ALL                              of fish in this key.
For variable LENGTH         TOTAL  Gulf Population  (*1000)

Age          10      11      12      14      ALL
LENGTH      Freq.   Freq.   Freq.   Freq.   Freq.
 013          0       0       0       0      15
 022          0       0       0       0      37
 025          0       0       0       0      34
 028          0       0       0       0      57
 031          0       0       0       0     110
 034          0       0       0       0     796
 037          0       0       0       0     966
 040          0       0       0       0    1105
 043          0       0       0       0     915
 046          0       0       0       0     681
 049          0       0       0       0     361
 052          0       0       0       0     441
 055          0       0       0       0     195
 058          0       0       0       0     553
 061          0       0       0       0     123
 064         27       0       0       0     242
 067          0       0       0      45     135
 070          0       0      50       0     101
 073          0       0       0       0     104
 088          0       0      54       0      54
 091          0       0       0       0      31
 103          0      31       0       0      31

TOTAL        27      31     104      45    7085
No Aged       1       1       2       1     194
Avg Len    64.0   103.0    79.3    67.0    45.9
Avg wt g   2073    9010    4184    2388     926
Bio  t       56     278     435     108    6562
% Sex M     0.0     0.0   100.0   100.0    48.5
```

```
R esearch V essel AN alysis    MALKEY2          Pgm ver:3.6    08/06/89
Age/Maturity  Length Key Statistics             Dat ver:1.01

                                                Page    3 of    3
Key Run by JM                                   Date   1/ 1/80    8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                               Date   1/ 1/80    8:55
For variable LENGTH           TOTAL  Gulf Population  (*1000)


LENGTH      No.   Total in    Total in      Avg      Avg    Sex
           Aged   Len Freq      Area        Age     Wt g    M %
 013         1        1        14531        2.0       15     0
 022         2        2        36608        1.5       77   100
 025         2        2        33702        1.5      114    50
 028         3        3        57091        2.3      161    66
 031         4        5       110069        2.0      221    50
 034        18       38       795630        2.8      294    33
 037        18       37       965884        3.2      382    50
 040        21       34      1105387        3.4      486    57
 043        22       29       914827        3.8      607    64
 046        26       25       680685        4.1      748    38
 049        12       12       361263        4.4      909    58
 052        16       14       440836        4.6     1092    31
 055        11        7       194675        4.9     1298    36
 058        13       13       552635        5.5     1530    46
 061         4        4       122888        5.8     1787   100
 064         9        9       242421        6.9     2073    44
 067         3        4       135162        9.3     2388    66
 070         2        3       100623        8.5     2734    50
 073         4        4       104495        7.5     3112    50
 088         1        2        53736       12.0     5542    99
 091         1        1        30848        9.0     6146     0
 103         1        1        30848       11.0     9010     0
           ----   -----     --------
Total      194      250      7084842        4.3      926    48


Notes: Avg Wt g  is the mean weight at that length calculated
                 from the length weight regression (the a & b are
                 listed in the header of the preceeding pages).
```

Output from the program **MALKey3:** both strata and survey variance estimates and set by set catch at age.

```
R esearch V essel AN alysis     MALKEY3         pgm ver:3.01   19/04/89
Age/Maturity  Length Key Statistics             dat ver:1.01

                                                Page    1 of    8
Key Run by JM                                   Date  1/ 1/80    8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                               Date  1/ 1/80    8:55
Length data from Cruise P188 (1977)

Experiment type : [key] 1,2                     [L.Freq.] 1
For Species     0012    White Hake
For sex codes  ALL
For variable STRATA/SET              Catch Numbers At Age

Age            01      02      03      04      05      06      07      08      09
STRAT/SET    Freq.   Freq.   Freq.   Freq.   Freq.   Freq.   Freq.   Freq.   Freq.

421/001       0.0     0.0     0.4     1.5     1.3     0.5     0.2     0.0     0.0
421/002       0.0     0.0     0.2     1.1     1.0     0.1     0.0     0.0     0.0
421/avg       0.0     0.0     0.3     1.3     1.2     0.3     0.1     0.0     0.0
421/CV%       0.0     0.0    44.8    21.1    17.8   112.2   141.4     0.0     0.0

420/003       0.0     0.0     0.7     1.1     0.6     1.6     1.2     0.7     0.2
420/007       0.0     0.0     0.7     1.2     1.4     1.1     0.1     0.5     0.0
420/avg       0.0     0.0     0.7     1.1     1.0     1.4     0.6     0.6     0.1
420/CV%       0.0   141.4     4.2     5.8    52.4    23.1   127.3    21.6   141.4

422/008       0.0     0.0     0.0     0.0     0.1     0.3     0.3     0.1     0.0
422/009       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
422/011       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
422/avg       0.0     0.0     0.0     0.0     0.0     0.1     0.1     0.0     0.0
422/CV%       0.0     0.0     0.0     0.0   173.2   173.2   173.2   173.2     0.0

424/010       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
424/031       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
424/034       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
424/avg       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
424/CV%       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

417/013       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
417/014       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
417/avg       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
417/CV%       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

419/019       0.0     0.0     0.3     0.6     0.8     0.6     0.4     0.2     0.0
419/020       0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
419/avg       0.0     0.0     0.2     0.3     0.4     0.3     0.2     0.1     0.0
419/CV%       0.0     0.0   141.4   141.4   141.4   141.4   141.4   141.4     0.0
```

```
R esearch V essel AN alysis    MALKEY3          pgm ver:3.01  19/04/89
Age/Maturity  Length Key Statistics             dat ver:1.01

                                                Page   2 of   8
Key Run by JM                                   Date  1/ 1/80   8:54
Cruise(s) in Key  P188 (1977)

L.Freq. Run by JM                               Date  1/ 1/80   8:55
Length data from Cruise P188 (1977)

Experiment type : [key] 1,2                     [L.Freq.] 1
For Species    0012    White Hake
For sex codes  ALL
For variable STRATA/SET            Catch Numbers At Age

Age          01      02      03      04      05      06      07      08      09
STRAT/SET Freq.   Freq.   Freq.   Freq.   Freq.   Freq.   Freq.   Freq.   Freq.

418/021     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
418/022     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
418/avg     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
418/CV%     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0

415/023     0.0     4.8    21.3    22.3     4.2     0.7     0.2     0.0     0.0
415/024     0.0     0.0     1.3     4.7     0.2     0.1     0.1     0.0     0.0
415/avg     0.0     2.4    11.3    13.5     2.2     0.4     0.1     0.0     0.0
415/CV%     0.0   141.4   125.0    92.0   126.6   103.3    86.0     0.0     0.0

416/030     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
416/032     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
416/avg     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
416/CV%     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0     0.0
 .
 .    sample file
 .
 .    new page

433/038     0.0     0.0     0.0     0.0     3.5
433/039     0.0     0.0     0.0     0.4     6.7
433/avg     0.0     0.0     0.0     0.2     5.1
433/CV%     0.0     0.0     0.0   141.4    44.7

434/040     0.0     0.0     0.0     0.0     0.0
434/041     0.0     0.0     0.0     0.0     0.0
434/044     0.0     0.0     0.0     0.0     0.0
434/avg     0.0     0.0     0.0     0.0     0.0
434/CV%     0.0     0.0     0.0     0.0     0.0
 .
 .    sample file
 .

ALL/ALL     0.9     1.0     3.2     1.5   270.6
Tot/avg    0.01    0.03    0.05    0.02    3.59
Tot/CV%   45.12    0.00   20.12   61.58   27.97
```

Output from the program **CatMap:** location and catch of a species for a single cruise. The file name is in the form XnnnSppp.PTS, where Xnnn is the cruise ID and Sppp is the four digit numeric code for the species. The following file, N0730043.PTS, is the catch of yellowtail from the RV Needler 73.

```
 RV survey N073: Yellowtail Flounder      catch  (kgs) 1986
 kgs
-60.51667  47.51667       3.0
-60.40000  47.13333       0.7
-60.76667  46.96667       0.4
-61.53333  46.28333       0.3
-60.95000  46.95000       0.3
-60.60000  47.68333       0.3
-60.36667  47.53333       0.3
-60.23333  47.28333       0.2
-60.68333  47.63333       0.2
-61.70000  46.13333       0.2
-61.85000  46.31667       0.2
-62.13333  46.31667       0.1
-61.68333  45.83333       0.1
-61.28333  46.93333       0.0
-61.68333  46.60000       0.0
-61.45000  46.73333       0.0
-61.45000  46.50000       0.0
-61.98333  46.11667       0.0
-61.63333  45.73333       0.0
-62.16667  46.00000       0.0
-61.26667  46.53333       0.0
-62.25000  45.86667       0.0
```

Note the longitudes are negative as the convention states Longitudes west of Greenwich and Latitudes south of the equator are negative. All coordinates are in decimals of degrees, ie. 0.50 degrees is 30 minutes.

Output from the program **PikAMap**. This program outputs several files, one of them, for the select option of the program writes a subset of the starting file. Another, from the editor option of the program, outputs each point by segment and produces a scater map of each segment. The segment size is selected by the user.

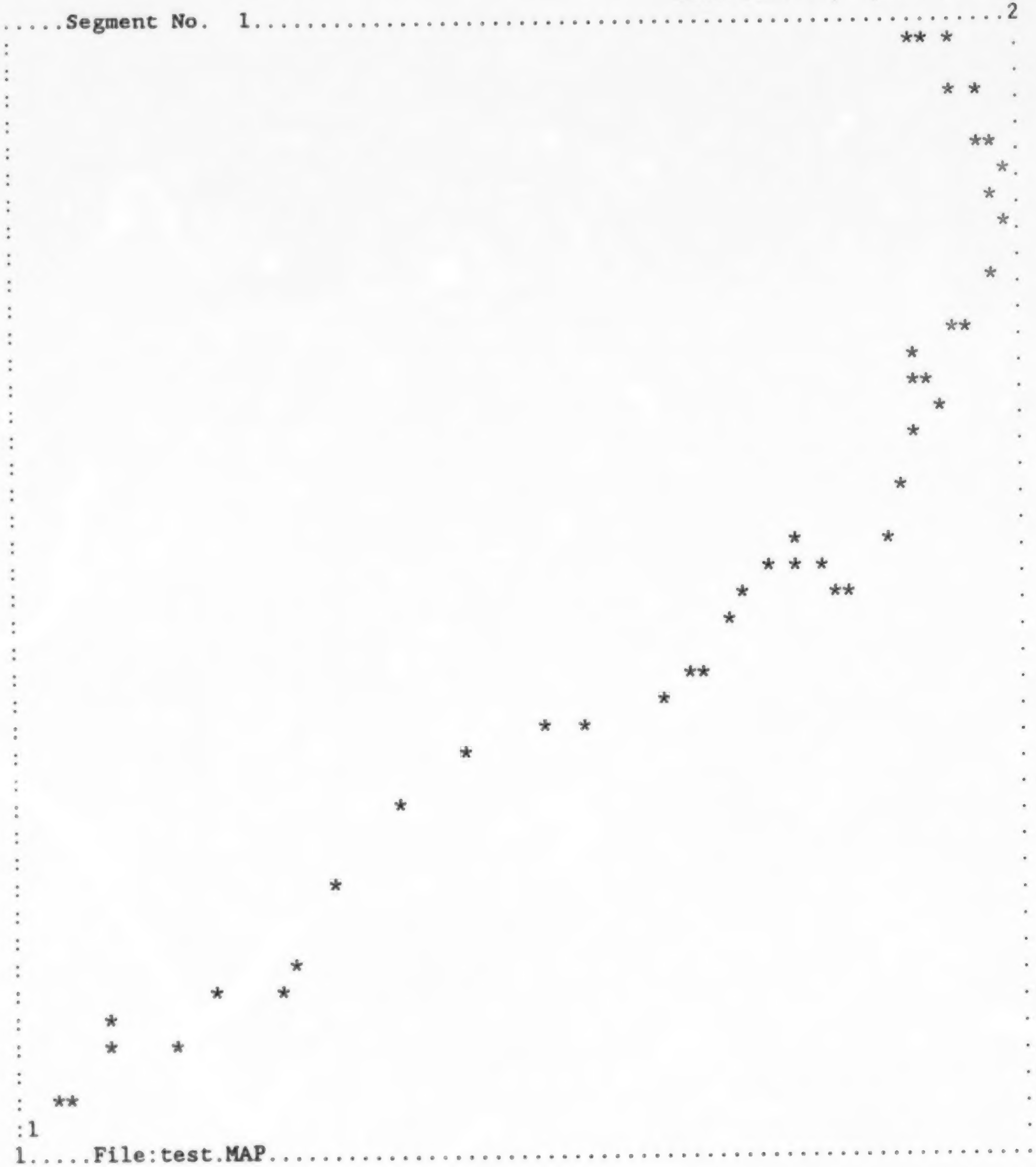
```
R esearch V essel AN alysis      PikAMap             pgm ver: 2.0   15/JAN/89
Segment No.   1                                      Date run: 89/ 7/17 10: 2a
Rec Num  Dist m.   LO/LA  Rec Num  Dist m.   LO/LA  Rec Num  Dist m.   LO/LA

    1   no dist.    /          2   4735.9      /         3   1872.0      /
    4   5149.7      /          7   6520.7      /         8    936.0      /
    9   6114.9      /         10   6520.5      /        11   2990.4      /
   12   6075.9      /         13   9804.3      /        14   8195.3      /
   15   8233.3      /         16   1490.6      /        18   13040.0      /
   19   4240.6      /         20   1489.6      /        22   4380.8      /
   23   3594.6      /         24   2678.2      /        25   2679.7      /
   27   2679.2      /         28   3592.8      /        29   2362.9      /
   30   4662.1      /         31   5355.7      /        32   2974.1      /
   33   3586.0      /         34   1459.0      /        35   4202.4      /
   37   4720.1      /         38   1459.2      /        39   4654.4      /
   40   2748.4      /         41   2103.9      /        42   5057.0      /
   43   4766.6      /         44   4219.9      /        45   2100.7      /
   46   3504.7      /         47   5334.7      /        48   4447.6      /
   49   1458.7      /         50   1458.7      /

  Mean distance between points  3636.59m.

  Total distance of segment   178193.06

  segment number   1 initial num   49 num written   43 num skipped    6

  Minimum distance   50.0
```

NOTES ON FOLLOWING MAPS

The bottom left corner and top right corner contain the numbers 1 and 2 respectively, these correspond to the maximum and minimum longitudes and latitudes of the map segment. The numeral '1' in the map itself indicates the first or starting point of that segment. An important feature of this program is visual editing, the user can quickly determine if some unlikely point is in the data file and can then check its validity.

R esearch V essel AN alysis

```
R esearch V essel AN alysis      PikAMap          pgm ver: 2.0    15/JAN/89
                                                  Date run: 89/ 7/17 10: 2am
```

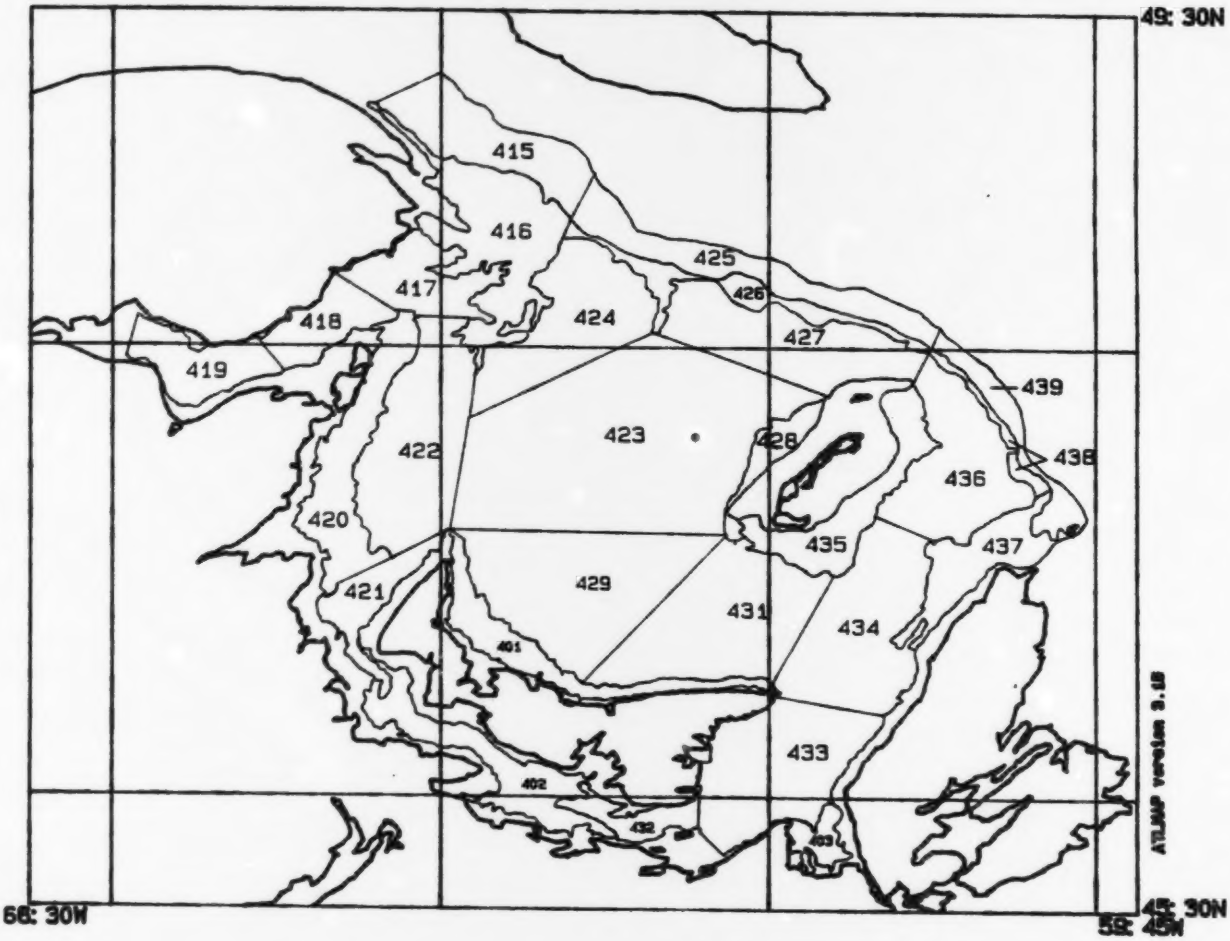


```
   (1) Maximum Longitude:-65.90517          (2) Minimum Longitude:-64.53448
       Minimum Latitude : 45.20737              Maximum Latitude : 45.97892

       First Point:-65.90517    45.20737        Difference Long:0.018276
       Last Point :-64.53448    45.88306                    Lat :0.017146
                  :32.07          :52.98
       No. of points:  49                       Total Distance:178.193 km
                                                Mean distance:3636.593 m
```

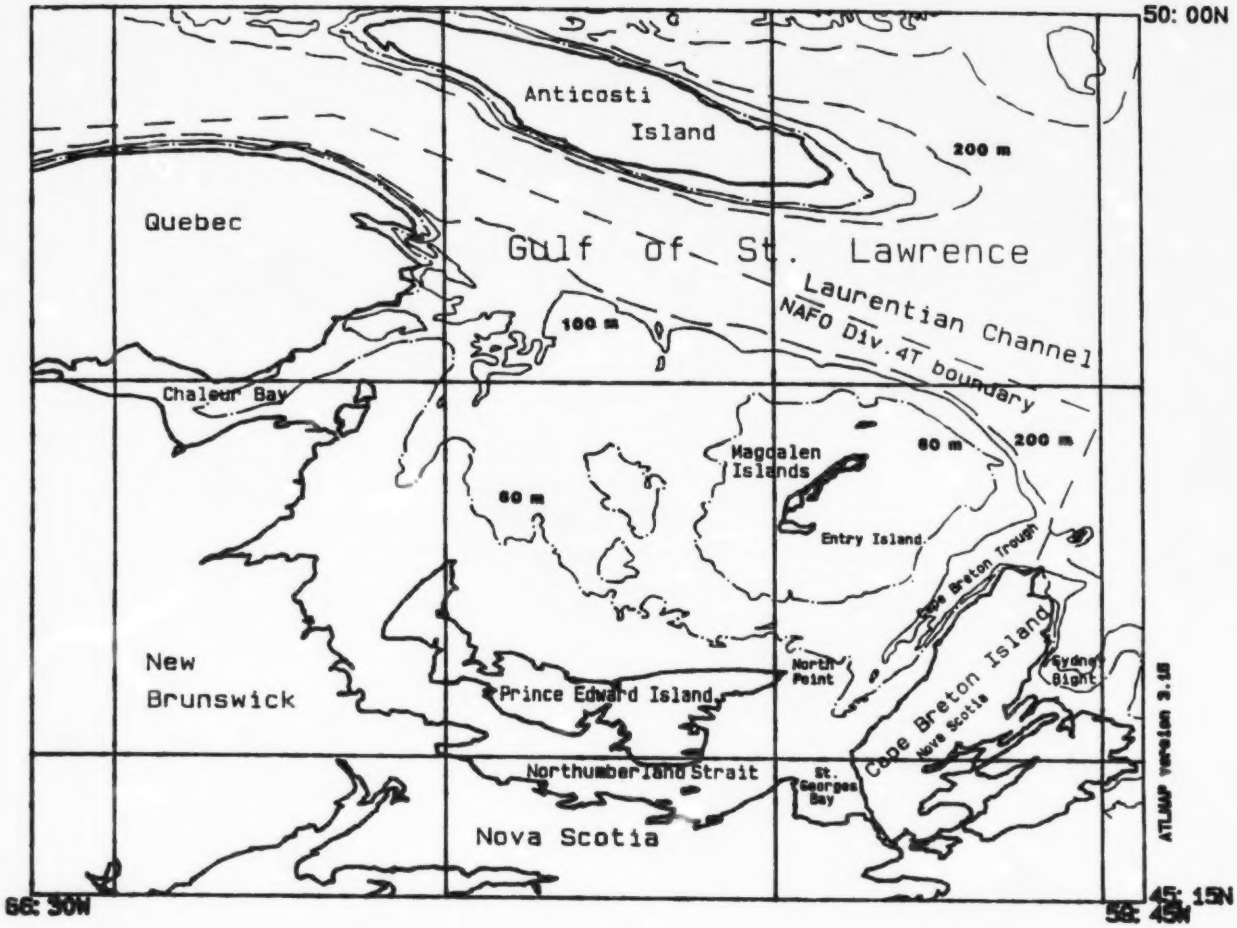
R esearch V essel AN alysis

```
R esearch V essel AN alysis   PikAMap         pgm ver: 2.0   15/JAN/89
                                              Date run: 89/ 7/17 10: 2am
.....Segment No. 4.....................................................2
:                *                                                     .
:                 *                                                    .
:                                                                      .
:                      *                                               .
:                            *                                         .
:                                                                      .
:                               *                                      .
:                                                                      .
:                                                                      .
:                               *                                      .
:                                                                      .
:                           *                                          .
:                      *                                               .
:                                                                      .
:                *                                                     .
:                                                                      .
:         *                                                            .
:   *                                                                  .
:                                                                      .
:                                                                      .
: *                                                                    .
:*                                                                     .
:                                *                                     .
:     *                                                                .
:                                            *      *                  .
:            *            *  *                                  *      .
:                                                                      .
:                                                                      .
:                                                                     *.
:                                                                      .
:                                                                      .
:                                                                     *.
:                                                            *         .
:                                                                   *  .
:                                                           *    *     .
:                            *      *        * *                       .
:                      **                   *             *            .
:                  *                  *   *   *         *              .
:                                     *                                .
:                *                         *   *   *                   .
:                                                                      .
:                   1                                                  .
1....File:test.MAP......................................................

 (1) Maximum Longitude:-61.46552               (2) Minimum Longitude:-60.94828
     Minimum Latitude : 45.22558                   Maximum Latitude : 45.57037

     First Point: 61.31035   45.22558              Difference Long:0.006897
     Last Point :-61.34483   45.57037                           Lat :0.007662
                 :20.69        :34.22
     No. of points:  49                            Total Distance:126.942 km
                                                    Mean distance:2590.643 m
```

Output from the program **AtlMap**. This program outputs a map on an HP plotter. Pen colours, thicknesses, etc are selected by the user and must be mounted in the plotter as required.



Map of stratum boundaries with labels marking each stratum.



Map of southern Gulf of St. Lawrence with location labels, depth contours, and NAFO division line.